VOL. XXIX. NEW YORK—THURSDAY, NOVEMBER 13, 1913—CHICAGO NO. 20.

The AUTOMOBILE

Great Britain Is Largest Buyer

Over 15,000 Automobiles Will Have Been Imported by the British Isles for 1913—France Heads the Importing Field—United States Is Second

GREAT BRITAIN, consisting of England, Ireland, Scotland, and Wales, continues as the greatest buyer of automobiles in Europe. For 1913 approximately 15,000 cars and chassis will have been purchased from outside nations, this representing but a slight increase of scarcely 100 cars over 1912. The nations profiting by this business are France, America, Belgium, Germany, and Italy. France gets the lion's share, her sales to Great Britain being twice as much as American sales. In actual figures, these sales exceed $8,000,000, whereas America is but little over $4,000,000. America holds second place, however, in the British selling market; Belgium comes third at $2,500,000, doing approximately five-eighths the business that we do. Germany is fourth, and Italy fifth. The following figures show that France sells to Great Britain almost as many cars and chassis as the other four countries combined. Here are the figures for 1912:

France	$8,309,000
United States	4,092,745
Belgium	2,525,450
Germany	1,712,120
Italy	1,269,655
Total	$17,908,970

An analysis of the cars sold in Great Britain shows that stripped chassis constitute a big percentage of the trade, in fact, more than one-half. It still remains a fact that a majority of the British buyers prefer to buy the chassis and fit a body suited to their requirements. The following figures show that America is deplorably lacking in this chassis-selling business to Great Britain, and that while she is second to France in the total volume of car and chassis business, she is fifth in the chassis business alone, coming after Belgium, Germany, and Italy, as well as France. France does twenty times the chassis business in Great Britain that the United States does. Little Belgium does four times the business; Germany also does four times, and Italy three times the business of the United States. It is an apparent fact that the large American car builders have taken little advantage of the British selling market in the selling field, whereas the manufacturers of complete low-priced American cars have made the British field a leader. Here are the figures on chassis sales:

France	$5,658,165
Belgium	1,183,985
Germany	1,089,865
Italy	914,330
United States	278,200
Total	$9,124,545

Great Britain buys an enormous volume of car parts from these five countries, and the 1912 figures show that America is fourth in this parts business, doing scarcely one-half the trade done by Italy, Germany, and France, which are all over the $4,000,000 mark. The following figures show

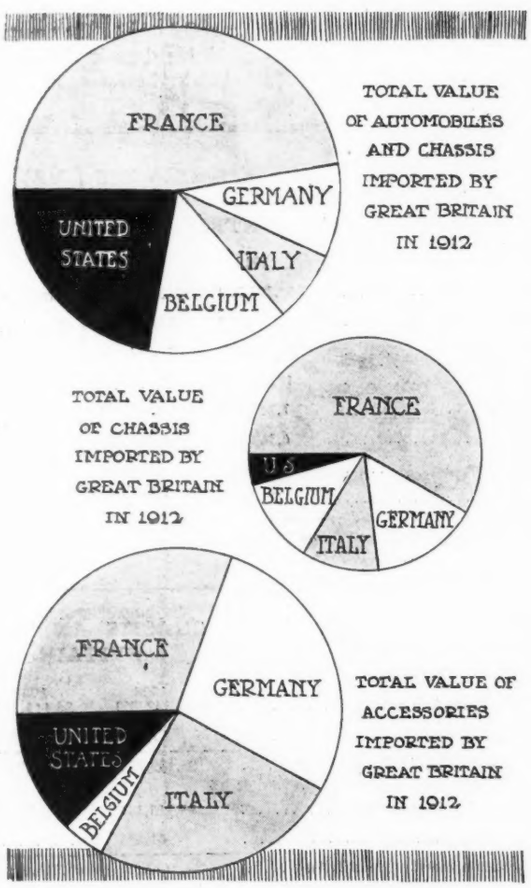
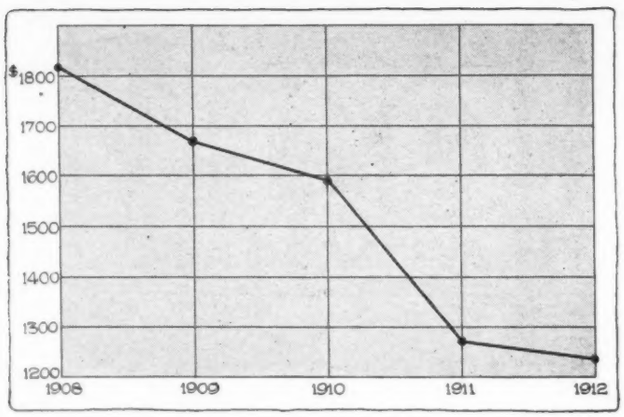


Diagram showing the automobile imports of Great Britain during the year 1912. The circles represent proportionately the values of cars and chassis, chassis only, and parts and accessories imported. The divisions indicate the relative business of each of the importing countries



Graph showing the drop in average price of automobiles imported by Great Britain during the last 5 years

that Italy has increased her business in the sale of accessories four-fold in 1911 as compared with 1910, and that her 1912 business was one-half greater than 1911; in other words, the last three seasons have seen the sale of Italian parts in England increase six-fold. The sale of American accessories has shown substantial gains but not up to the figures of Italy. In 1911 the total sales were three times those of 1910, and 1912 showed an increase of 66 per cent. over 1911. Although these percentages of increase in themselves make a good showing yet a consideration of the comparative total amounts of accessory business transacted by the various importing countries brings out very forcibly the fact that America has still a long way to go before catching up with the three leaders, France, Germany and Italy.

The following figures show that France increased her parts business in 1912 one-third over 1911. The German business is increasing slightly and the Belgium trade shows a small gain. The following figures show the value of accessories sold in Great Britain during 1912:

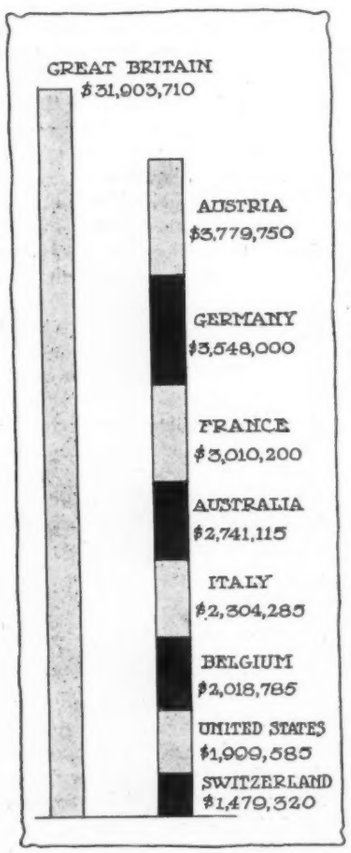
France	$4,866,170
Germany	4,323,655
Italy	4,124,215
America	2,077,340
Belgium	943,060
Total	$16,334,430

Statistics show that each succeeding year Great Britain is importing lower priced cars and chassis. The averages show that the price of imported cars has fallen from $1,815 in 1908 to $1,240 in 1912; and the average chassis price has fallen from $1,575 in 1908 to $1,265 in 1912. The following figures show the gradual drop in price:

	Car Prices	Chassis Prices
1912	$1,240	$1,265
1911	1,265	1,290
1910	1,595	1,275
1909	1,665	1,360
1908	1,815	1,575

Together with this fall in the price of chassis during the last 5 years a similar reduction, showing even a greater total drop, has occurred in the average price of the complete vehicle as shown by the chart at the head of this page. A most noticeable point in connection with the cheapening of both chassis and complete cars is that the prevailing price is practically the same, the car being slightly the cheaper. There can be no doubt as to the reason for this; and the increasing popularity of the small car of the large producing factories of the United States is assuredly one of the contributing factors.

A big drop in the car price took place during 1910. With the chassis, however, as shown in the chart at the base of page



Showing comparative values of the automobile import business of leading countries

VALUE OF AUTOMOBILES, CHASSIS AND PARTS EXPORTED FROM DIFFERENT COUNTRIES

	1912	1911
France	$42,396,760	$35,154,000
United States	30,788,610	21,085,385
Great Britain	18,412,340	15,981,190
Germany	18,194,750	11,637,500
Italy	7,743,145	6,272,785
Belgium	6,349,500	5,412,655
Switzerland	2,709,420	2,121,740
Austria	1,211,555	1,005,835
	$127,801,080	$98,621,090

VALUE OF AUTOMOBILES, CHASSIS AND PARTS IMPORTED BY DIFFERENT COUNTRIES

	1912	1911
Great Britain	$31,903,715	$26,563,865
Austria	3,779,750	3,874,985
Germany	3,548,000	2,870,500
France	3,010,200	2,560,400
Australia	2,741,115	2,522,895
Italy	2,304,285	1,546,925
Belgium	2,018,735	1,267,585
United States	1,999,585	2,098,480
Switzerland	1,479,320	1,338,48

FOREIGN AUTOMOBILES, CHASSIS AND PARTS IMPORTED TO GREAT BRITAIN

	1908	1909	1910	1911	1912
Value of complete cars	$6,947,760	$6,115,265	$7,199,810	$8,589,915	$9,133,390
Value of re-exports	807,805	885,320	117,229	1,542,845	1,791,020
Net consumption in Great Britain	$6,139,955	$5,229,995	$6,027,520	$7,047,570	$7,342,870
Value of chassis re-exports	$5,315,385	$6,607,980	$8,357,965	$8,669,945	$9,509,145
Re-exports	44,223	.....	.....	.....	.....
Net consumption in Great Britain	$4,873,155	$6,216,625	$7,833,755	$7,855,770	$8,635,2100
Parts	$8,299,160	$8,859,800	$10,116,865	$12,745,935	$17,087,100
Re-exports	546,570	692,465	914,360	1,085,910	1,160,965
Net consumption in Great Britain	$7,752,590	$8,167,335	$9,202,020	$11,661,025	$15,926,135
Total value of all imports	$18,765,700	$19,613,905	$23,063,280	$26,563,865	$31,903,715

901, the price has deviated only slightly during the past 3 years and is not likely to show much difference for 1913.

When the grand total of car, chassis, and accessories purchased by Great Britain from foreign countries is considered, it shows that these purchases are increasing approximately one-sixth each year, and basing 1913 on figures covering the first nine months it is a safe assumption that this year will show one-sixth increase in business over last year.

The total value of imported cars, chassis, and parts by Great Britain in 1911 was $26,563,865; in 1912 it rose to $31,903,715, and estimates for 1913 place it at $37,835,613.

But Great Britain is more than a consumer of motor vehicles. She is an exporter of no mean stature and in her export business she sells almost as much to foreign countries as she does to her own possessions. In 1912 her export business was 58 per cent. of her import business. Her total exports for that year showed $19,163,470 as compared with imports $31,903,715. Of her export business, $10,765,500 went to her possessions in America, Africa, Asia, Australia, and the Islands of the Sea. During that year she sold to foreign countries $8,397,970.

Statistics show that her export percentage is declining slightly with her imports, as the following figures for the last 5 years will show: 1912 exports 58 per cent. of imports; 1911 exports 66 per cent. of imports; 1910 exports 56 per cent. of imports; 1909 exports 38 per cent. of imports, and 1908 exports 33 per cent. of imports. From 1908 to 1911 there was a general increase in percentage of exports to imports but there has been a slight falling off from 1911 to 1912. It will be interesting to note how this percentage holds when the total figures for 1913 are made public.

From the British Viewpoint

The figures for 1912 show a substantial increase all round. In 5 years the total value of all imports has increased £2,627,605 and the total number of cars and chassis 6,250.

The prices of both cars and chassis are considerably higher than the average value of the imports, the average price of exported cars being $1,915 and chassis $1,855. From this it is evident that the average price of British-built cars is high and, that as yet, the British manufacturer is not seriously undertaking the manufacture of cheap cars.

The British automobile exports consist chiefly of those sent to her own possessions. The values for chassis, complete vehicles and parts exported to British possessions has always exceeded the exports to foreign countries as the following figures, which show the respective amounts for the past 5 years indicate.

BRITISH GOODS EXPORTED

To Foreign Countries

	1908	1909	1910	1911	1912
Complete cars	$1,161,510	$1,461,325	$1,737,455	$2,328,225	$3,136,730
Chassis	169,455	298,905	685,820	662,295	1,463,625
Parts	1,059,520	1,760,180	3,378,735	3,372,325	3,797,615
Total	$2,395,490	$3,520,410	$5,802,010	$6,362,845	$8,397,970

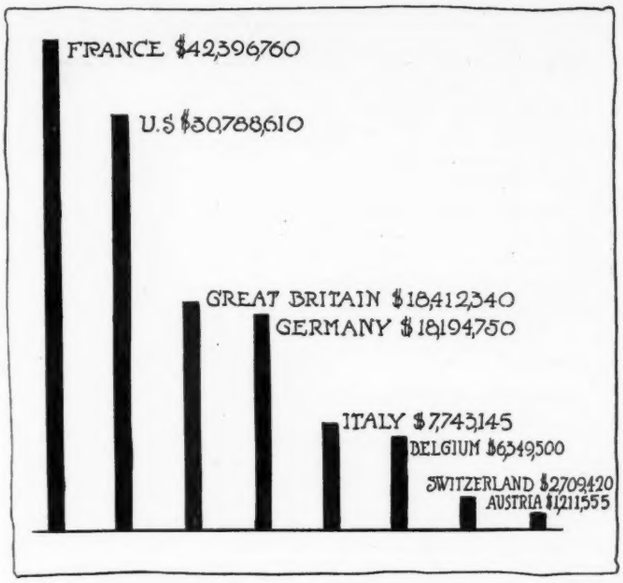
To British Possessions

	1908	1909	1910	1911	1912
Complete cars	$2,841,665	$3,300,830	$5,146,975	$6,693,870	$6,981,845
Chassis	260,465	127,875	381,860	821,150	1,463,625
Parts	850,175	868,910	1,696,790	2,053,325	2,320,030
Total	$3,902,305	$4,297,615	$7,225,625	$9,568,345	$10,765,500

The ratio between Great Britain's business with foreign countries and her own possessions, it will be observed, remains fairly stationary though the volume is increasing steadily year by year. For 1912 the exports to British colonies exceeded those sent elsewhere by about 25 per cent.

The imports and export figures up to September 30 of this year show an increase in all lines. It is now possible to get the value of tires which are separated from parts. It will be seen that for the first 9 months of this year the importation of tires amounts to no less than $10,293,450 out of total imports of $28,491,710 not deducting the re-exports.

A striking indication of the size and possibilities of the British market is afforded by the import chart on page 900. In this the



Values of automobiles, chassis and parts exported from various countries

relative values of the total automobile imports for 1912 of several of the principal consumers are graphed. It will be noticed that the figure for Great Britain, $31,903,710 more than equals the combined figures of the other countries, which are led by Austria with $3,779,750.

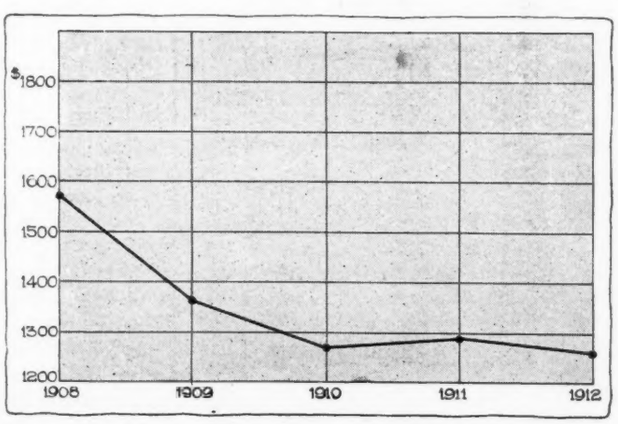
World's Motor Statistics

The following statistics of the world's motor trade are interesting. The aggregate exports of eight countries amount to no less than $127,806,080. France has still the highest figures of exports, namely, $42,396,760, followed by U. S. A. with $30,788,610.

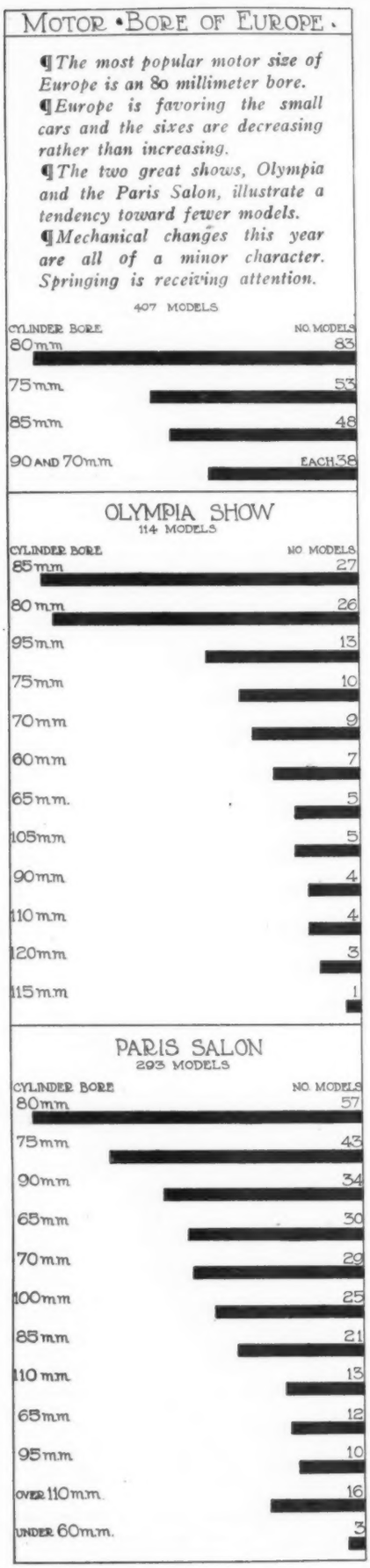
The figures in the import and export tables on page 900, show that of the European countries Great Britain has the largest turnover. In addition to the large home consumption the imports and exports combined total over $50,000,000.

No country in the world has such an array of vehicles offered for sale as Great Britain. It is safe to assert that considerably over 600 models of various types are at the choice of the British buyer. The following gives the approximate number of cars in range of prices:

Prices	Number of Models	Prices	Number of Models
$500 to $750	60	$2,001 to $2,750	65
751 to 1,000	38	2,751 to 2,550	60
1,001 to 1,250	48	2,551 to 2,750	42
1,251 to 1,500	65	2,751 to 3,000	48
1,501 to 1,750	72	Over $3,000	50
1,750 to 2,000	65		



Showing the drop in average price of chassis imported by Great Britain for the past 5 years



Olympia Opens with 644 Exhibitors

Special Cable to THE AUTOMOBILE

By J. S. Critchley
President Institution of Automobile Engineers

LONDON, ENGLAND, Nov. 8—Olympia has opened, and this year 644 exhibitors show their products to an unusually large and cosmopolitan gathering. On the floor there are 126 different makes of automobiles, while the actual number of cars is far above this as the manufacturers are showing as a rule at least two adaptations of their chassis.

This year America ranks third in the number of automobile manufacturers represented at the show, having eleven. England, of course, leads with forty-nine and closely following is France with thirty-five. Italy and Belgium are each represented by nine firms, Germany by eight, Switzerland, two, and Spain, Holland and Austria each have sent one company to be represented at the international gathering. Last year America was fifth on the list of exhibitors, having but 6 per cent. of the total number of cars shown. This year 9 per cent. of the automobiles at Olympia have been shipped across the seas from Yankeeland.

The imposing proportions to which the accessory business has grown may be realized by the large number of exhibitors of that class at this show. There are 418 concerns which have secured space. Tire, wheel and rim makers are represented by 370 exhibitors. This is more than double the number of all the other makers of accessories present as they number only 148.

All Mechanical Changes This Year of Minor Character

No startling mechanical changes are shown this year. In fact, the one striking fact that seems to be the chief lesson of the show is one that has been anticipated and predicted during the entire past year. This is that Europe is about to adopt the electric starter. Arrol-Johnston, Sheffield-Simplex, Daimler, Armstrong, Lanchester and Siddeley have already fitted them to their cars and indications are that the majority of the other makes will fall in line.

Electric lighting is as popular abroad as it is here. Luxury is the keynote of the entire exhibition. Upholstery, easy springing and fine coachwork have been in the limelight for the past year and the results of this concentration are visible at this show. The streamline body offers many opportunities for the clever designer and the artistic sense of the European is exemplified on every hand. The intention to abolish the break between the bonnet and the body has resulted in bodies of easy-flowing curves and beautified appearance. The color schemes seen at the show tend toward contrasts. Startling effects in black and white are some of the ideas that seem to attract the popular fancy. In the main, light colors are the more prominent.

All through the interior, fittings and accessories are more luxurious and costly. Many novelties in window fitments, etc., are seen on the closed cars, while the touring bodies are fitted with conveniences such as adjustable front seats.

Miniature Cars Are Well Represented

The miniature car field is well represented and the crowds continue to gather about these small vehicles whose high-speed, high-efficiency motors have formed a leading topic of discussion among the well-informed during the past year.

Attractive new models are exhibited and of special interest are the Daimler 20 and the Darracq 12 and 16. The Maudslay company has a car at the show with the Reno sleeve engine which it has recently adopted. The Germain-Knight is also shown. Alterations in design in the standing models are few but a noticeable gain in the number of cantilever springs in use speaks well for this type of suspension. The Arrol-Johnston company shows an electrically propelled coupé using the new Edison accumulator. A study of the technical situation shows a leaning toward dry-plate clutches and cooling ribs on the lower part of the crankcase.

There is no diminution of interest in Olympia. The aisles of the show are continually thronged and visitors both in and out of the trade are arriving from all over the Continent. A study of the crowd shows that the high spot of interest is in

the electric, air and spring starters. Aside from the starter situation the coachwork attracts the most attention.

Development of the automobile in Europe and America is running along parallel lines. The European, with his eye for the artistic side of the industry, points the way in the development of body design. The streamline form and the luxurious fittings found in the most up-to-date practice are of European origin. On the other hand, Yankee ingenuity and the demand of the American for mechanism to replace manual labor have given birth to the electric starter, which has swept over this country and which now is about to be adopted by the foremost English and Continental makers.

A show like Olympia affords an opportunity for summing up the development to date. It is here that the trend of the times is shown and the lines upon which the engineers are occupied are brought freely before the eyes of the buyer. It is therefore worthy of comment to note that the actual changes of a mechanical nature in the motor are very few. Ease of control, silence and comfort as furnished by deep upholstery and excellent spring work on the other hand have been given more attention and it is for this reason that we see the increase in certain types of springs, drive, etc.

Small Motor Is Feature

Another point that appears very prominently in the European field is the small economical motor. It will be noticed that many of the new models are light four-cylinder cars which, while not necessarily of low price, are distinguished by their economy both as regards fuel consumption and tire upkeep. In many instances more than 40 miles to the gallon of gasoline is secured by these cars.

In the table on the following two pages it will be seen that many small cars are listed by concerns for 1914, whereas such models were not made for the preceding year. Chief among these are the Alldays with a 59 millimeter bore and 100 millimeter stroke (2.32 by 3.94 inches), at a price of £157. Hillman 60 millimeter bore by 120 millimeter stroke (2.36 by 4.72 inches), at a price of £250. Singer, 63 by 88 millimeters (2.48 by 3.46 inches), at £190. Standard, 62 by 90 millimeters (2.44 by 3.54 inches), at £185. Swift, 69 by 120 millimeters (2.72 by 4.72 inches), at £285, and the W. R. M., 60 by 90 millimeters (2.36 by 3.54 inches), at £180. These sizes may seem small and the prices high to the average American mind, but it must be remembered that these cars embody the highest degree of finish and they are built on the high efficiency plan which has been made a necessary development on account of the high fuel cost in Europe.

Tendency Is Toward Fewer Models

In spite of the fact that there are many of these new small cars the tendency is toward the elimination of surplus chassis models. What was discovered in America two or three seasons ago is now becoming impressed on the British manufacturer who sees that he cannot expect to keep down his cost of manufacture if he is compelled to buy machinery to take care of a large number of models which are so little alike that it is impossible to turn out any large number of parts and thus to cut the time per piece rate.

The mechanical features of the 1914 cars remain very much the same as in 1913. Worm drive is making steady progress and although not many are changing their cars to this type of drive practically all the new models are designed for it. It seems to be the general consensus of opinion at the show that the worm drive has come to stay and that each year will see an increase in the number that use it.

Thermo-syphon cooling remains practically stationary. It is generally adopted for all cars up to about 80 millimeters bore. Above this pump circulation is in use.

The leather cone clutch has not lost in popularity and cars in which it has been adopted still keep it for the most part. In a few cases where there has been a change it has been to the single plate type similar to that used in the De Dion, Siddeley-Deasy and Rover patterns.

In ignition there have been no changes worthy of mention. The majority of cars at the Olympia show are using the Bosch dual system, and there is no noticeable inclination to change to other systems. Vauxhall is fitting the Bosch starting magneto and others are adopting the Mea, owing to its success on cars which competed in the French races during the past season.

Four-Speed Gearbox Gains

The four-speed gearbox is coming more and more into the ascendant and the public is demanding this number of speed changes in the light cars, while even the larger companies which have withheld have at last swung into line. The Daimler company, for example, is now constructing cars with four-speed gearboxes and the Napier company is also offering the same number of speed changes.

Modifications in suspension are comparatively few. The Lanchester system of inverted cantilever remains popular and it has been adopted by the Daimler company in a modified form in connection with its new 90 by 130 model. The Rolls-Royce, Sheffield-Simplex and Siddeley-Deasy cars are all equipped with this type of suspension and it is stated that many other concerns are studying this type of rear spring with a view to possible adaptation at a later date.

Two features which seem to have at last reached the end of their tendency to increase are the stroke-bore ratio and the six-cylinder motor. The most popular motor size at Olympia is about 85 by 130 millimeters, giving a stroke-bore ratio of 1.53. At the French show 80 by 130 was found to be the most popular motor and these two sizes represent the stroke-bore ratios which seem to be most desirable. As for the six-cylinder motor, the Arrol-Johnston, Austin, Star, Alldays and Napier companies have dropped it. The first four concerns have omitted them altogether and the Napier company has stopped manufacturing its large type. The Sheffield-Simplex company is also building but one model of six, this being an 89 by 127. One new six appears and this is the Hillman 60 by 120, listed at £480. The number of six-cylinder cars now offered by British manufacturers is only seventeen out of a total of approximately 150.

Detachable Wheels Standard

Detachable wheels are now being fitted as standard to a very large extent. The proportions are approximately as follows: Wire detachable, 35 per cent.; steel detachable, 35 per cent.; wood detachable, 12 per cent.; detachable rims, only 10 per cent.; ordinary artillery wheels, 8 per cent.

The Daimler company is distinctive in regard to new models. Three of the previous year are described and two new ones are substituted, so that now there are four models in place of five. One of the new models embodies a new size of engine having a bore of 110 millimeters and a stroke of 130. This car will be made in both four and six-cylinder sizes and will sell for £560 in the four-cylinder type and £925 in the six-cylinder size. The Humber company has brought out two new models of small size, so that this firm for 1914 will construct six models. This is extraordinary in view of the general inclination of makers to reduce rather than increase the number of their models.

One Model for Sheffield-Simplex

The Sheffield-Simplex is a good example of concentration on one model for next year, this company focusing on its 30-horsepower car which has been on the market this year, but dropping the 25 and 45-horsepower models. It is a six, 89 by 127, with cylinders in threes. A U. S. L. electric flywheel starter and lighting mechanism has been added. Every precaution has been taken to get robustness and efficiency in the motor. The crankshaft is 70 millimeters in diameter and carried on seven bearings, that at the flywheel being 4 inches long; the steel pistons have the lower part drilled to reduce weight; the camshaft runs in an oil bath; camshaft and magneto shafts are chain driven; and the inside of the intake and exhaust manifolds are scraped and

polished to give a smooth surface for the passing gases. The care given the motor is seen in the chassis which is now fitted with the Lanchester or cantilever rear spring. Sandwich washers are used to prevent noise due to loose parts in the chassis, these washers being triple ones, a middle washer of rubber with a metal one secured to each side of it.

The Arrol-Johnston car exemplifies the growing tendency of the English manufacturer to furnish the car complete at an exclusive figure. These cars are among those equipped with electric lighting and starting, two of the three models being so fitted. A distinctive feature of this line is incorporated in the new 15.9-horsepower car. This is the use of a long straight narrow frame to which outside reinforcements of wood are fitted to give the necessary width to accommodate the body. The engine and gearbox form a single unit and are tilted in the frame so that a straight line drive is provided. Following the clutch tendency this member now requires no lubrication, as the steel plate is gripped between Thermoid faces. The rear axle is a new type and has a malleable center divided vertically with tubular steel extensions.

Napier Features New Model

In the Napier line the chief interest centers around the new model known as the 30-35. This takes the place of the 30-horsepower model and in it the bore is increased from 82 to 89 millimeters, while the stroke remains the same at 127. The features of the Napier motor are the inclined valve and the high pressure oiling system. In the valve the heads are brought very close to the pistons by inclining them towards the center of the engine. This reduces the area of the valve ports. In the lubricating system oil is forced to all the bearings by a pressure of from 20 to 25 pounds per square inch. The oil is filtered both before and after delivery to the pump. According to the formula rating the engine develops 29.4 horsepower. On the brake, 55 horsepower was registered. The carbureter is the Napier two-jet with an extra air inlet controlled from the dash, and operated by pedal. The single floating disk type of clutch is used, the single disk being of steel gripped between two plates covered with Ferodo. The springing of the car has been given careful attention, the upper member of each rear spring being carried in a bracket which incloses the end of the blades. Rudge detachable wire wheels are used.

The Lanchester line does not show any distinctive change over the 1913 models. Neatness of body work is the leading feature for 1914. Perhaps this is best exemplified by the manner of carrying the spare wheel in a rear compartment of the car in such a manner that it is completely concealed.

At Olympia two cars are being shown. One of these is a 38 horsepower coupé limousine and the other the touring type. The tire carrying compartment is located on both these vehicles, but is invisible to the casual observer. The door covering the compartment is arranged with heavy panels so that when closed the moulding appears to be part of the ornamentation of the car.

Vauxhall Changes Few

Vauxhall changes have been very few. The 25-horsepower model which was introduced last year has stood the test of the season and has been classed as a successful type. A change in the standard equipment, however, has been made this year in that the Bosch starting magneto has been supplied on three of the four models, the smallest type, the 16-20, not having been fitted with this type of magneto. The Prince Henry chassis which is rated at 25 horsepower and has four cylinders with a bore of 95 millimeters and a stroke of 140 millimeters, the wheelbase has been increased to 10 feet and the tires are now 105 by 875 millimeters instead of 120 by 820 millimeters. The streamline body with built-in dash gives a very neat, low touring car.

Daimler cars are all fitted with Knight engines as last year. A new car, built somewhat on American lines of construction and known as the Daimler 20, has brought the number of models to four for this season. The new model has a mechanical starter, combined gearbox and rear axle, cantilever type of rear springs and worm drive. The four-cylinder engine has no departure from characteristic Daimler sleeve valve design except that provision is made to carry an electric lighting dynamo and the new Daimler seven-jet carbureter is used. The gearbox being mounted with the rear axle makes it more convenient to mount the worm above the worm wheel in order to keep the clearance great enough with the gearbox located at this point. The driveshaft is inclosed in a tubular steel casing carried forward from the end of the gearbox, extending to the center of the chassis where it ends in a spherical housing which forms a ball and socket joint and transmits the torque and driving thrust to the frame. The differential is mounted on a prolongation of the worm shaft behind the rear axle.

The same three models that the Sunbeam company manufactured in 1913 will be continued for 1914 with a few minor improvements. The most important change is the alteration of the

COMPARISON OF ENGLISH MOTORS FOR 3 YEARS IN BORE, STROKE AND HORSEPOWER

Name of car	1912 Bore and stroke, m.m.	1913 Bore and stroke, m.m.	1914 Bore and stroke, m.m.	Bore and stroke, inches	S.A.E. h.p.
TWO-CYLINDER CARS					
Adams	.....	.....	85x96	3.35x3.78	9.00
Alldays	.....	95x114	86x 92	3.39x3.62	9.00
Dodson	80x120	113x127	113x127	4.45x5.00	15.80
	100x140	127x127	127x140	5.00x5.51	19.90
Enfield	.....	.....	86x 92	3.39x3.62	9.20
Humber	.....	.....	84x 90	3.31x3.54	8.70
Phoenix	.....	90x100	.....	.....	.....
	.....	102x115	.....	.....	.....
Swift	.....	65x100	.....	.....	.....
FOUR-CYLINDER CARS					
Aberdonia	89x127	89x127	89x127	3.50x5.00	19.80
Adams	88x120	88x120	.....	.....	.....
Alldays	.....	.....	59x100	2.32x3.94	8.70
	.....	76x120	76x120	2.99x4.72	14.40
	86x108	86x130	86x130	3.39x5.12	18.2
	101x130	101x130	101x130	3.98x5.12	24.9
Argyll	72x100	72x120	72x120	2.83x4.72	12.8
	80x120	80x130	80x130	3.15x5.12	15.9
	101x130	100x130	100x130	3.94x5.12	25.8
Armstrong	80x135	80x135	80x135	3.15x5.21	15.9
	85x135	85x135	85x135	3.35x5.21	17.9
	.....	.....	90x150	3.54x5.91	20.1
	100x120	100x120	.....	.....	.....
Arrol Johnston	69x120	69x120	69x120	2.72x4.72	11.9
	80x140	80x140	80x120	3.15x4.72	15.9
	.....	.....	90x140	3.54x5.51	20.1
Austin	.....	76x 89	76x 89	2.99x3.50	14.3
	89x115	89x115	89x127	3.50x5.00	19.6
	110x127	110x127	110x152	4.33x5.98	30.6
Baguley	90x130	90x130	90x130	3.54x5.12	20.1
Bell	90x120	90.5x120	90.5x120	3.54x4.72	20.3
	101x140	101x140	101x140	3.98x5.51	26
	115x120	117x150	117x150	4.61x4.72	32.8
Belsize	69x130	69x130	69x130	2.72x5.12	11.8
	.....	80x140	80x150	3.15x5.91	15.9
	94x121	93x120	.....	.....	.....
B.S.A.	75x114	75x114	75x114	2.95x4.49	13.9
Briton	68x120	68x120	68x120	2.68x4.72	11.3
	.....	80x120	80x127	3.15x5.00	15.9
Calthorpe	69x125	69x125	69x125	2.72x4.92	11.8
	80x150	80x150	80x150	3.15x5.90	15.9
	.....	.....	80x130	3.15x5.12	15.9
Cheswold	.....	.....	80x120	3.15x4.72	15.9
Clement Talbot	80x120	80x120	80x120	3.15x4.72	15.9
	.....	90x140	90x140	3.54x5.51	20.1
	101x140	101x140	101x140	3.98x5.51	25.6
	.....	.....	80x130	3.15x5.12	15.9
Clement	.....	75x110	75x110	.....	13.9
	85x120	95x120	95x120	3.74x4.72	22.4
	107x130	107x130	107x130	4.21x5.12	28.9
Crossley	80x120	80x120	80x120	3.11x4.72	15.9
	101x140	101x140	101x140	3.97x5.51	25.6
	.....	.....	80x130	.....	15.9
Daimler	90x130	90x130	90x130	3.54x5.12	20.10
	101x130	101x140	.....	.....	.....
	124x130	124x130	.....	.....	.....
	.....	.....	110x130	4.33x5.12	30
Dennis	.....	80x130	80x130	3.15x5.12	15.9
	.....	90x130	.....	.....	.....
	100x130	100x130	100x130	3.94x5.12	24.8
Enfield	76x120	76x120	76x120	2.99x4.72	14.3
	86x108	86x130	86x130	3.39x5.12	18.4
	100x115	100x130	100x130	3.94x5.12	24.9
	.....	.....	59x100	2.32x3.94	9.2
Hillman	89x114	89x110	.....	.....	.....
	127x127	127x127	.....	5.00x5.00	40
	.....	.....	60x120	2.36x4.72	8.9
Humber	68x120	69x130	69x130	2.72x5.12	11.9
	78x110	75x130	75x140	2.95x5.51	13.9
	90x120	90x120	90x130	3.54x5.12	20.1
	105x130	105x140	105x140	4.13x5.51	27.3
	.....	.....	65x120	2.56x4.72	10.5
Iris	80x114	80x114	80x114	3.15x4.49	15.9
	108x133	108x133	108x133	4.25x5.24	28.9
	127x133	127x133	127x133	5.00x5.24	40
Lanchester	101x101	101x101	101x101	3.98x3.98	25.6

position of the gearbox which has in each case been moved back 3 inches in the frame. This has been done to provide a longer shaft between the engine and the gearbox and therefore to reduce the angularity of this shaft, due to variations in alignment under loads and stresses. Another result of the change in the gearbox location is the shortening of the propeller shaft. Another change is to drive the fan by belt instead of through skewed gearing as last year. The steering pillar supports have been increased in size and the wheel has been enlarged from 15.5 inches to 17 inches in the smaller cars. In the entire line of models the rear wheel brakes have been increased in size and in the six-cylinder model the pedal-operated propeller shaft brake has also been increased in size. Several silence features have been incorporated in the 1914 Sunbeam cars, the most important being a spring plunger which bears against the door when it is closed, thus preventing it from rattling. The door also closes against rubber blocks. The bolt of the lock is tapered and projects further from the door than is required, so that no spreading of the door posts, due to frame distortion, will cause door rattling.

Wolseley Continues Three Models

Wolseley is one of the English concerns which does not believe in annual models, therefore it is not surprising to note that the three models introduced last year are continued without change. A small alteration was made, however, since show time last year in the valve. A Dermatine valve has taken the place of the ground-in-steel valve and seating. A novel feature of the line put out by the Wolseley is that in the smaller six-cylinder model either a bevel or worm drive is supplied, according to the desires of the purchaser. Both the six-cylinder models are fitted with the Wolseley compressed air type of engine starter, controlled by levers on the dash. On all three models metal-to-metal, multiple-disk clutches are provided and on the four-cylinder model and smaller six, a four-speed gearbox is fitted. Three speeds only are used on the larger six. The underslung springs which have been in use during the last year on the Wolseley models have proven themselves to be entirely satisfactory. Detachable wire wheels are fitted on all models.

No new Argyll models are making their appearance at this year's Olympia. The three models, developing respectively 18, 30 and 50 horsepower, have been continued. A few slight changes will be found, however, the poppet valve model, for instance, now having variable ignition. Both the poppet valve model and the two larger models with the sleeve engines will be fitted with a gasoline gauge on the dash. During the last year the experiment of dispensing with the junk ring in the cylinder head was tried on the smaller sleeve motor, and the result is that all the heads are now made plain. The water pump on the sleeve models has been rendered more efficient and alterations in the contours of the gas passages have resulted in a more powerful motor in all cases than last year. The two larger models are fitted with electric lighting plants, but electric starting has not as yet made its appearance on Argyll cars.

The Star Engineering Co. have four models, known as the 10, 15, 15.9 and 20, on their program for 1914. One of the interesting features of the Star practice is that the center webs of the I-beam connecting rods are drilled to lighten the weight. This is common practice in aeroplane motor work, but it is rather unusual for automobile design. The cylinders are offset and the pistons are very short, being about equal in all cases to the cylinder diameter. The pistons have three rings and extremely thin skirts. No rims are visible on the conical tops of the pistons. It will be noticed that the 10-horsepower crankshafts are carried on two bearings. The pistons have but two rings on the 10-horsepower motor and have flat tops. The 10-horsepower gearbox has three-speeds and a reverse. The higher speed is a direct drive through dog clutches. The driveshaft is square and the bearings are plain with phosphor bronze bushing. The wheels on the layshaft are fixed by feathers. Bevel drive is used in the rear axle on the 10-horsepower chassis, the pinion being supported on both sides and as a further reinforcement a double ball thrust is provided. The differential is also of the best type.

Allday Has New Small Car

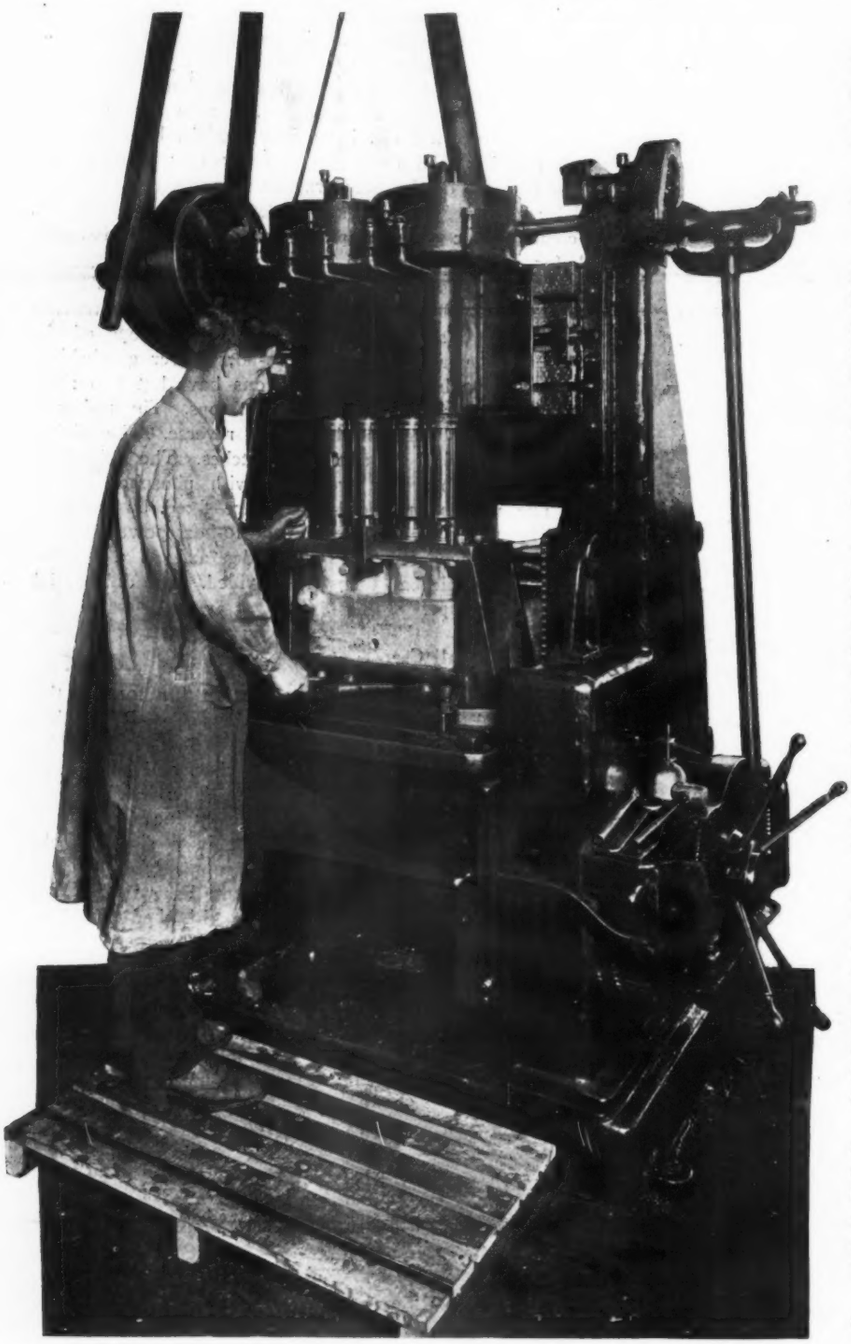
A new minature car is the only alteration for 1914 in the line manufactured by the Alldays & Onions Co. Everything has been done in this new car to make it as light as possible. The bore is but 59 millimeters or 2.32 inches, and the stroke is 100 millimeters or very close to 4 inches. The chassis frame is constructed of pressed steel, while the engine rests on a tubular subframe. The cylinders are cast in a single block. The gearbox provides three speeds and reverse run on ball bearings, a Zenith carbureter and the magneto has variable timing. The cooling water is circulated by the thermo-syphon system. Detachable wire wheels are fitted and an extra wheel is provided at the price of £157-10-0.

COMPARISON OF ENGLISH MOTORS FOR 3 YEARS IN BORE, STROKE AND HORSEPOWER

Name of car	1912 Bore and stroke, m.m.	1913 Bore and stroke, m.m.	1914 Bore and stroke, m.m.	Bore and stroke, inches	S.A.E. h.p.
Maudslay	90x130	90x130	90x130	3.54x5.12	20.3
New Engine	114x114	114x114	114x114	4.49x4.49	32.2
	127x114	127x114	127x114	5.00x4.49	39.9
Napier	82x127	82x127	82x127	3.23x5.00	16.9
	.....	.....	89x127	3.51x5.00	19.6
N.B.	.....	.....	69x140	2.72x5.51	11.9
	.....	69x100	69x100	2.72x3.94	11.9
Pilot	65x110	65x110	60x110	2.36x4.33	8.9
Rothwel	79x127	79x127	79x127	3.15x5.00	15.5
	101x127	101x127	101x127	3.98x5.00	25.6
Rover	75x130	75x130	75x130	2.95x5.12	13.8
	90x130	90x130	90x130	3.54x5.12	20.1
Singer	.....	78x125	78x125	3.07x4.92	15.1
	80x130	80x130	80x130	3.15x5.12	15.9
	90x130	90x130	90x130	3.54x5.12	20.1
	.....	.....	63x 88	2.48x3.46	9.7
Siddeley	.....	75x114	65x114	2.56x4.49	13.9
	.....	80x130	80x130	3.15x5.12	15.9
	.....	90x130	90x130	3.54x5.12	20.1
Standard	79x121	79x121	79x121	3.11x4.76	15.6
	.....	89x134	89x134	3.50x5.28	19.6
	.....	.....	62x 90	2.44x3.54	9.5
Star	.....	80x120	80x120	3.15x4.72	15.9
	.....	.....	.....	3.15x4.72	.....
	.....	80x150	80x150	3.15x5.90	15.9
	.....	90x150	90x150	3.54x5.90	20.1
Straker	87x120	87x120	90x120	3.54x4.72	20.1
Sunbeam	80x150	80x150	80x150	3.15x5.90	15.9
	90x160	90x160	90x160	3.54x6.30	20.1
Swift	.....	65x100	.....	.....	.....
	68x110	75x110	75x110	2.95x5.12	13.9
	85x120	90x120	.....	.....	.....
	.....	.....	.....	.....	17
	.....	.....	69x120	2.72x4.72	11.9
	.....	.....	80x130	3.15x5.12	15.9
Turner	60x100	60x100	60x100	2.36x3.94	8.9
	69x110	69x110	69x120	2.72x4.72	11.9
Vauxhall	90x120	90x120	90x120	3.54x4.72	20.1
	.....	95x140	95x140	3.74x5.51	22.5

Name of car	1912 Bore and stroke, m.m.	1913 Bore and stroke, m.m.	1914 Bore and stroke, m.m.	Bore and stroke, inches	S.A.E. h.p.
Vulcan	80x120	80x120	80x120	3.15x4.72	15.9
	80x150	80x150	80x150	3.15x5.90	15.9
	.....	80x130	.....	3.15x5.12	15.9
Waverley	.....	75x120	65x130	2.56x5.12	13.9
Withers	.....	90x130	90x130	3.54x5.12	20.1
	.....	100x130	100x130	3.94x5.12	24.8
	.....	110x130	110x130	4.33x5.12	30
	.....	120x130	120x130	4.72x5.12	35.7
Wolseley	90x120	90x120	90x120	3.54x4.72	20.1
W.R.M.	.....	.....	60x 90	2.36x3.54	8.00
SIX-CYLINDER CARS					
Alldays	.....	95x114	.....	.....	.....
Armstrong	90x130	90x150	90x150	2.72x4.72	30.10
Arrol-Johnston	80x120	80x120	.....	.....	.....
Austin	110x127	110x127	.....	.....	.....
Belsize	94x121	93x120	93x120	2.72x5.12	11.80
Clement-Talbot	80x120	80x120	80x120	3.15x4.72	15.90
Daimler	80x130	90x130	90x130	3.45x5.12	30.10
	101x130	101x140	.....	.....	.....
	.....	.....	110x130	.....	.....
Hillman	.....	.....	60x120	2.36x4.72	13.50
Lanchester	101x101	101x101	101x101	3.98x3.98	20.30
Maudslay	90x130	90x130	90x130	3.54x5.12	30.20
Napier	.....	82x127	89x127	3.51x5.00	29.40
	101x127	101x127	101x127	4.01x5.00	38.40
	127x127	127x127	.....	.....	.....
Rolls-Royce	114x127	114x127	114x127	4.49x5.00	48.60
Sheffield-Simplex	89x127	89x127	89x127	3.50x5.00	29.40
	114x114	114x114	.....	.....	.....
Siddeley	.....	90x120	90x130	3.54x5.12	30.20
Star	80x120	80x120	.....	.....	.....
Sunbeam	80x150	80x150	80x150	3.54x5.11	30.20
Vauxhall	90x120	95x120	95x140	3.74x4.72	33.50
Vulcan	89x120	89x120	89x120	3.50x4.72	29.40
Wolseley	90x120	90x120	90x120	3.54x4.72	30.40
	114x146	114x146	102x145	4.02x5.51	48.60

Bores Eighty Cylinder Castings a Day



THIS machine is a time and money saver. By its use the Hupp Motor Car Co. of Detroit bores 320 cylinders a day, or reams 480. The machine is operated by one man while another inspects the work. The total setting up time on the job is 1 minute, this includes putting the casting in the machine and taking it out. By the use of this machine the cutting speed of the tool is increased, the accuracy of the work bettered and the floor space required one-third as great as by the former methods. The tool is distinguished by the fact that the spindles do not move up and down but have their cutting hands always at the same distance from the support thereby eliminating any chance of having the hole that it bores larger at the bottom than at the top. The big factor in time saving with this machine is that the entire work is finished at one setting whereas in the former method it took four separate settings for cylinder block.

Special Machine That Turns Out 120 Reamed Hupmobile Block Cylinder Castings a Day

THE machine shown in the accompanying illustration rough bores eight cylinder castings an hour. When used for finish reaming from ten to twelve castings an hour can be handled. The machine is known as a special four-spindle boring and reaming machine and is especially adapted for work with Hupmobile model 32 cylinders. When using the machine for boring work eighty-four cylinder castings are finished every day. When used for the finish reaming work from 100 to 120 four-cylinder castings are finished in a day.

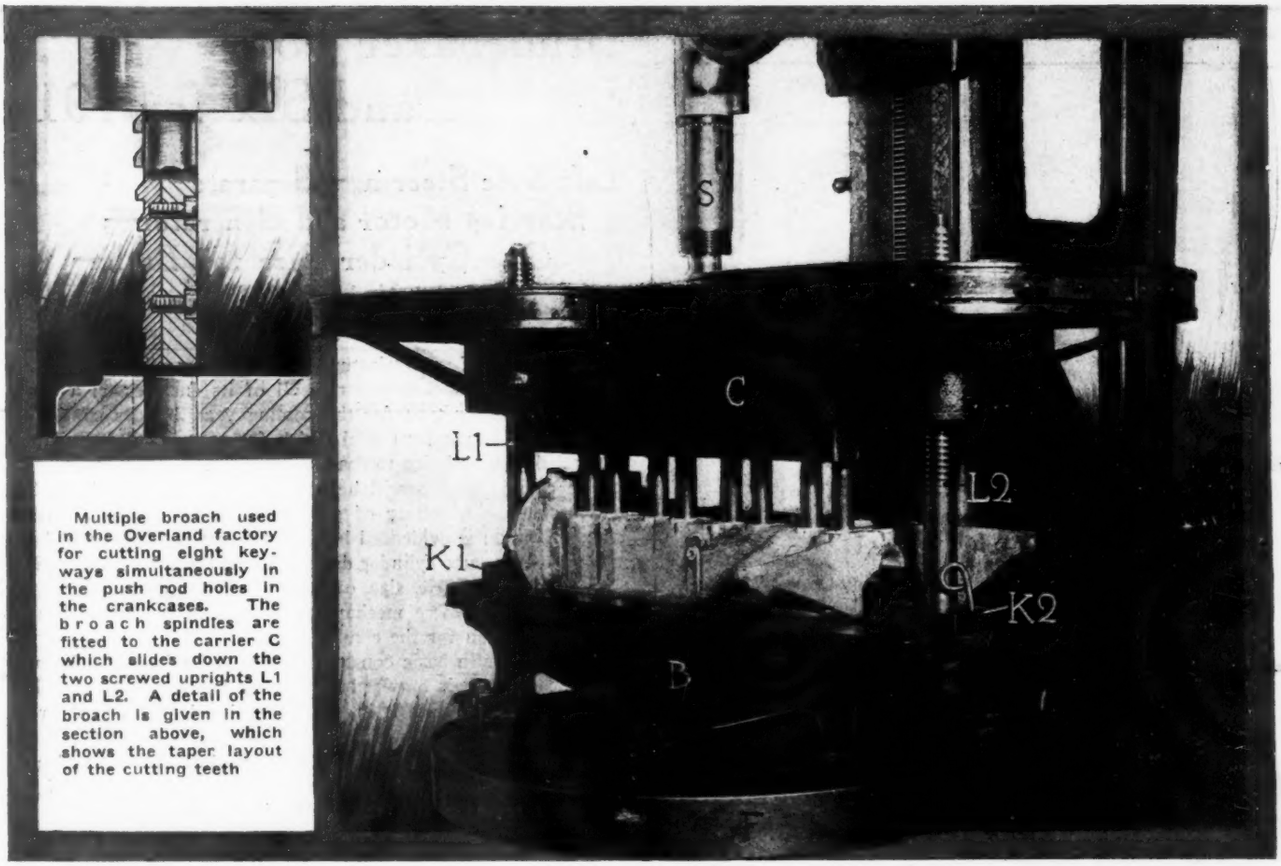
It takes but one man to operate the machine, while another inspects each piece of work after it has been completed. The time of both these men is charged to the single job. The raw castings come in to the machine at one side and the finished parts are laid down on the other. It takes him 1 minute to fasten the casting in the fixture in the machine and have it ready to be operated upon, unfasten it and remove it from the machine after the operation. That is to say, the entire setting time is 1 minute for each casting, including putting the casting in place and taking it out of the machine.

The old method of machining was to bore one hole at a time in a single spindle machine. With this special machine the work is done over four times as fast because in addition to operating on four holes at a time the greater rigidity in the machine enables the cutting speed to be increased. Besides, instead of having to make a separate set up for each cylinder bore the set up is done for four cylinders at a time.

In this machine the spindles do not move up and down. The cutting heads are always the same distance from the support of the spindle bearings and therefore there is no tendency for the holes to be larger at the bottom as with the ordinary drilling machine spindle which lowers further and further from its support.

One block cylinder is machined at a time in one setting, while in the old method the spindles have to be set once for each bore or four times in all. This is not only a time-saving factor, but it eliminates many of the chances of error, as all bores must be in line with each other when done with this method. In the old method where the cylinder is reset for each bore the four bores are apt to be out of line.

The four-spindle machine is very compact occupying a floor space 4 by 7 linear feet or an area of 28 square feet. Four single spindle machines with the necessary working space around them would take three times as much floorspace as one of the four-spindle machines.



Multiple broach used in the Overland factory for cutting eight keyways simultaneously in the push rod holes in the crankcases. The broach spindles are fitted to the carrier C which slides down the two screwed uprights L1 and L2. A detail of the broach is given in the section above, which shows the taper layout of the cutting teeth

Machine Cuts Eight Keyways in 1 Minute

BY the use of the multiple broach machine shown in the accompanying illustration, eight keyways in the push rod holes of the Overland crankcase are cut in a single operation. This ingenious machine is an adaptation of an existing 42-inch drill press of which the spindle S and the faceplate F are noticeable in the photograph. The special base B is mounted on the faceplate and two uprights, L1 and L2, extend from the ends and support on the threaded upper portions the carrier C. The upper face of this carrier is in the form of a horizontal gear case in which are situated two large gear wheels running on the thread of the stationary leading screws L1 and L2. A pinion on the end of the drill spindle S meshes with both these wheels, driving them down the leading screws at a uniform rate, and taking with them the carrier C.

Fixed to the underside of the carrier are the eight broaches distanced accurately to slide into the already drilled push rod holes. The form of the broach is shown in the section at the left in which it will be seen that the teeth are cut on a single piece of steel which is quickly detachable by removing the screws which hold it into the slot extending along the spindle. The teeth cut progressively, that is, the upper ones project further from the spindle than the lower ones so that each tooth takes a slight cut until the keyway is completely machined.

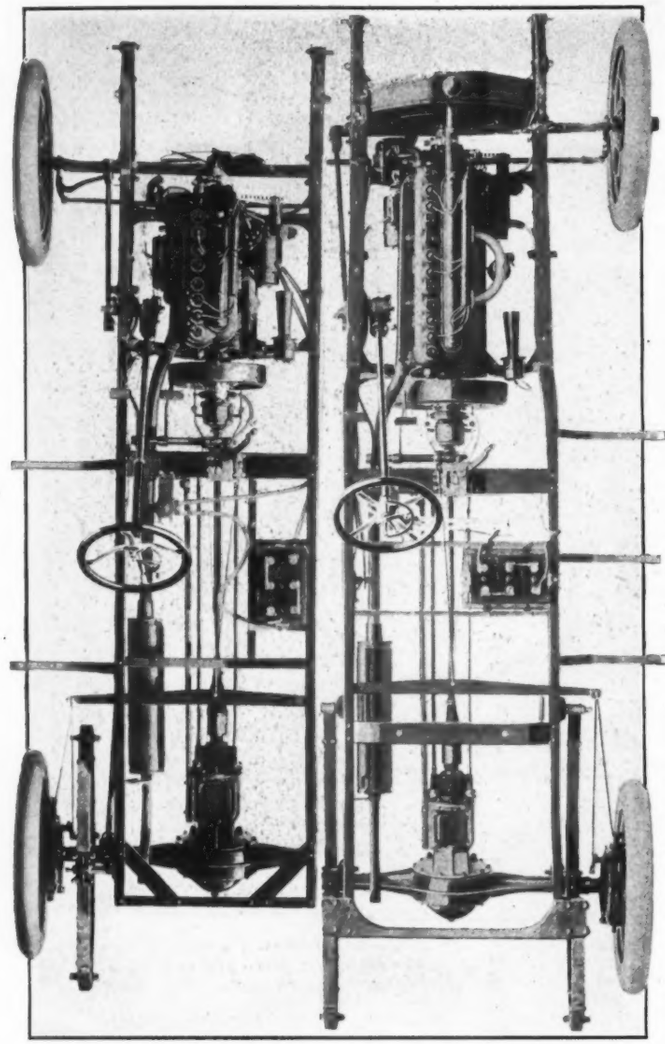
The actual time taken for this broaching operation, including the setting of the crankcase and removal from the machine is exactly 1 minute so that this machine has no difficulty in keeping pace with the other forty-six operations which every Overland crankcase passes through before it is sent to the assembly department.

An interesting feature, which contributes largely to the speed at which the machine can operate, is the method of setting and fixing the crankcase half on the baseplate. This is accomplished without the use of any bolts or screwed parts, in a few seconds. The face of the baseplate is brushed of chippings as each piece is machined. The crankcase is set by placing in position with location studs on the baseplate fitting into the bolt holes in the flange of the crankcase, and the whole is then made firm by sliding the clamps K1 and K2 up against the ends. These clamps are provided with taper plugs on the inner face which project into the machined hole for the camshaft, and hold the casing down firmly.

The feed is automatic by screw and needs no other attention on the part of the operator than merely starting. A reversal of direction takes place at the end of the cut, withdrawing the broaches, and it is then that the clamps K1 and K2 are of use, holding the crankcase down firmly. During the actual cutting of the keyways, there is, of course, no strain on these clamps.

The machining processes immediately preceding the broaching operation described are also of great interest, from the point of view of rapid work combined with accuracy. A multiple drill is used for the first drilling of the push rod holes. The crankcase is then passed to a reaming machine in which the holes are brought to their final size ready for the broaching operation by eight reamers in a single movement. A special feature of this machine, which makes for absolute accuracy in the distancing of the holes, is that the reamers are of the floating type, that is, they hang with a certain amount of looseness on the spindles so that they find their own centers in the holes.

After reaming, all the push rod holes are tested with plug gauges and must show a degree of accuracy within .0001 inch.



At the left is the chassis of the four-cylinder Studebaker for 1914. Note the gearbox integral with the rear axle and also elliptic springs in rear. At the right is a six-cylinder chassis on which three-quarter elliptics are used at the rear

The New Studebakers

Two chassis types—a four and a six.
Three body styles—touring, landau-roadster and sedan.
Tapering hoods, streamline bodies, full U doors.
Left drive and center control throughout.
Two-unit electrical equipment on all cars; generator driving from a shaft; motor acting on driveshaft by chain which moves only during cranking operation.
Ignition from main storage battery, through coil and shaft-driven Remy distributer.
Thirteen Timken bearings.
Floating axles on both models.
Gasoline tank under cowl.
Equalizers on both sets of brakes, working through slots in frame.
New clutch trunnion ring lubrication.
Studebaker-Schebler carbureter.
Flat top pistons.
Underslung full elliptic rear springs on four.
Wheelbase on four, 108 inches; on six, 121 inches.
Passenger capacity of four, five; of six, seven.
Auxiliary seats of six fold into recess in back of front seat when not in use.
Prices: Touring cars, $1,050 and $1,575; landau-roadsters, $1,200 and $1,950; six sedan, $2,250.

Studebaker Four and Six for 1914

Left Side Steering—Separate Starting Motor and Generator—One Cylinder Size for Both—Standardization In Parts of Both

INSTEAD of manufacturing four four-cylinder models, Studebaker will concentrate all of its energies on a single four-cylinder type for the coming year, besides continuing to make a six-cylinder model which for 1914 is quite similar in general design and size to that of last year.

The chassis models will be known as the Four and the Six and besides this limiting of production to two models, further standardization is evidenced by the fact that both cars will have motors of the same cylinder dimensions and general construction. This allows a single size of piston, connecting-rod, wristpin, piston ring and valve mechanism throughout the entire Studebaker production for the coming year.

Few changes in basic construction are to be found in the new cars, although their outward appearance has been altered. The most noticeable change is in the sloping hood, which at the rear meets the sloping cowl without a break.

The tonneau of the six has been widened at the rear and now includes ample seven-passenger capacity, the auxiliary seats folding into a recess in the back of the front seat.

Convertible Roadster Body

In addition to the touring bodies with which the cars will be fitted in standard form, both the four and the six will be marketed with a body of the convertible type, termed a landau-roadster, which is a copy of a design by Salmon & Sons, the English body builders. With top down and windows lowered, the car is merely a roadster of conventional type and in cold or inclement weather the top can be raised, windows slipped into place, and, with a few adjustments it becomes a veritable coupé. The six chassis will also be furnished in limited quantities with a sedan body.

The dash of the new cars contains an ingenious and original grouping of equipment. In the center and mounted well up is a bracket on which are compactly assembled the large-figure Stewart speedometer, the electric indicator dial and the sight-feed of the lubrication system. The dash lamp, attached to the top of the fixture, illuminates all three.

Left Drive Fitted

To a great extent the changes in detail apply with equal force to both models. Most prominent is the inauguration of left drive and center control. The importance of this change, in the case of a manufacturer who has sold more than 120,000 cars of the right control and steering type, is especially noteworthy as an indication of the popular demand. The centralizing of the control levers also simplifies the details of the brake and gear-shifting mechanism. In accordance with this change, making entrance and egress equally easy from either side, both running boards are entirely free of equipment made possible by providing a rack for an extra rim in the rear and placing the battery box under the front seat.

The conventional plan of placing the gasoline tank of the touring models under the front seat has been abandoned. The tank is now under the cowl, securing a short and nearly vertical feed to the carbureter, and at the same time allowing the seats to be noticeably lowered and made more comfortable.

The four lists at $1,050 as a touring car and $1,200 as a landau-

roadster. Referring to the touring car, this figure is $240 under the price of the corresponding body type of model 35 of this season, although it is somewhat higher than the price of the discontinued model 20. Its equipment includes 32 by 3.5-inch tires and it has 108-inch wheelbase. In many respects it is an entirely new car. It has a floating axle—an improvement over the entirely satisfactory type employed in the model 35.

For the six, the prices are $1,575, $1,950 and $2,250 for the touring car, landau-roadster and sedan, respectively, which figures are little changed over those of the present year. Tires on the six are 34 by 4. With its wheelbase continued at 121 inches, it retains many of the prominent characteristics of the former Studebaker six. The motor is about the same; the transmission system has been altered merely by the addition of several details tending to reduce friction and facilitate adjustment.

The general equipment includes Goodrich tires, Booth demountable rims, Stewart speedometer, electric horn, Gray & Davis lamps, silk-mohair top, Jiffy type curtains, extra rim and tire carried on the rear, windshield adjustable for ventilation and rain vision, and complete tool set.

In both models the unit gearbox rear axle construction is used; both use the two-unit Wagner starting-lighting system; and there is a marked standardization of nuts, bolts, washers and other small parts, in the chassis and power plants.

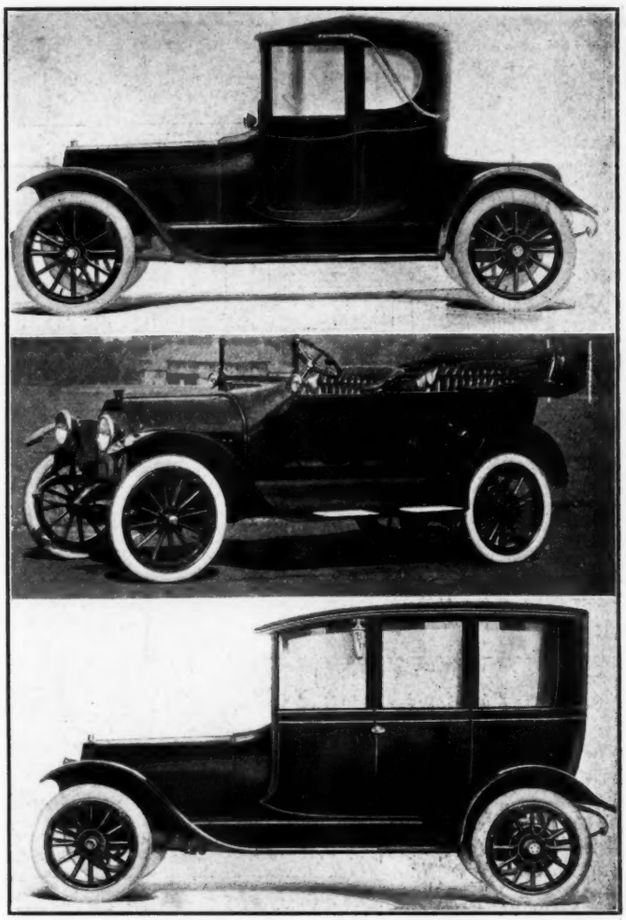
Bore-Stroke Ratio 1.43

The motors are of the long-stroke, small-bore type having dimensions of 3.5 inches diameter by 5 inches stroke which gives a stroke-bore ratio of 1.43. The position of the gasoline tank allows the carbureter to be mounted well up alongside the motor, where an abundant supply of warm air is always available. The intake manifold is much shorter than on any prior Studebaker engine. Wide range of carbureter adjustment is permitted from the dash. A Schebler carbureter, along the lines of the Indianapolis concern's Model R, but altered somewhat for Studebaker requirements, is standard equipment.

Reduces Number of Piston Rings

Instead of turning on the cast iron bearing of the piston bosses, wristpins now turn on bronze bushings, making adjustment and replacement possible without renewal of the piston. The pistons themselves are flat-topped, instead of being crowned as on this year's cars; are much lighter and are equipped with but three rings, tests having proven that this number is ample for conservation of power, while the change at the same time reduces the friction within the cylinder fully 25 per cent.

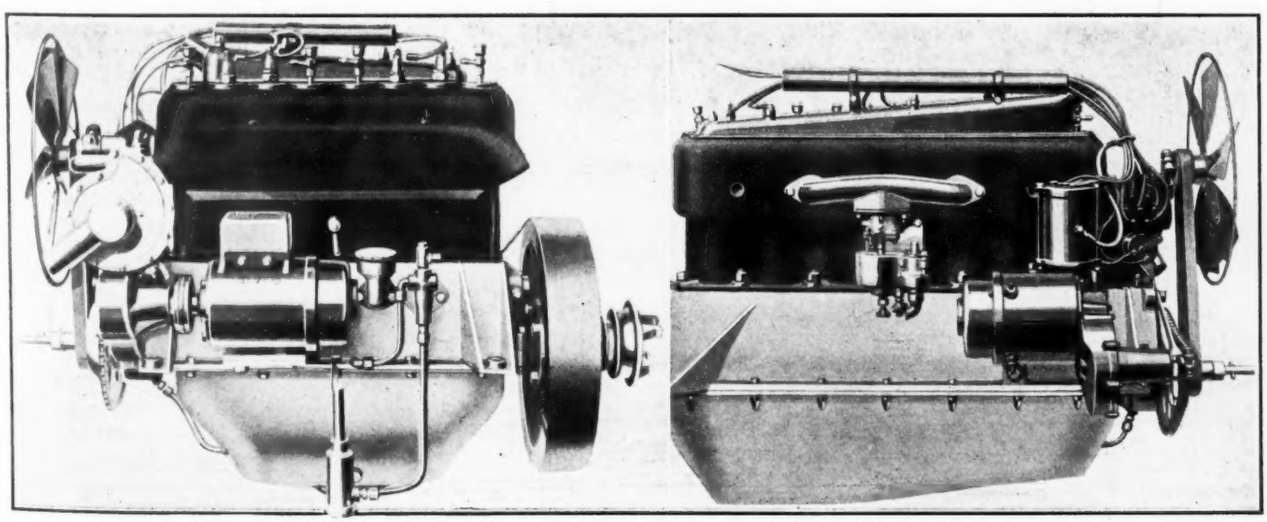
The left or valve side has the usual design of valve mechanism



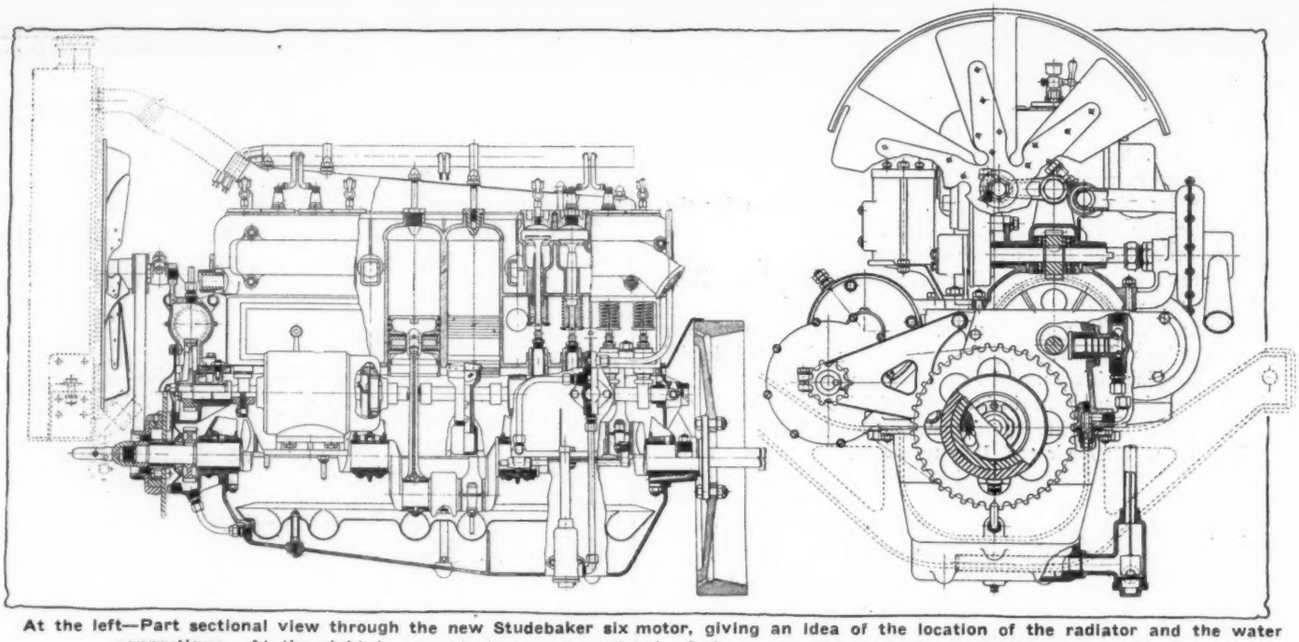
At the top—New Studebaker six landau-roadster, a three-passenger car with 121-inch wheelbase, having left drive and center control, complete electric system and floating rear axle. Price $1,950

In the middle—Studebaker four-cylinder touring car built to carry five passengers and having 108 inches of wheelbase, left drive, center control and selling for $1,050

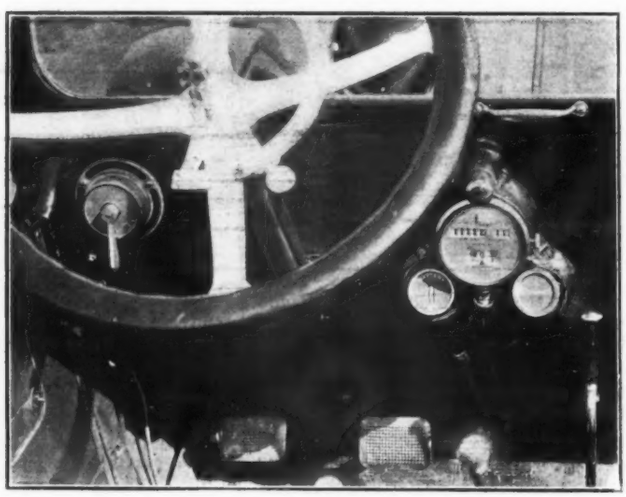
At the bottom—Studebaker six sedan, carrying five passengers and having a 121-inch wheelbase, full electric system, crowned fenders and marketed for $2,250



At the left—Left side of four-cylinder Studebaker model for 1914, showing pump, electric generator, etc., as well as the integral exhaust manifold. At the right—Right side of Studebaker six motor showing electric generator and pump. Note intake manifold bolted to the cylinders



At the left—Part sectional view through the new Studebaker six motor, giving an idea of the location of the radiator and the water connections. At the right is an end view, part sectional, of the same motor with the supporting arms indicated



Studebaker dash and control elements showing the grouping in one bracket of the Stewart speedometer, electric Tell-tale and sight-feed, all under the dash lamp located over the speedometer. The electric switch is on the extreme left. The plunger by which the cranking device is operated is placed close to the front of the seat and does not show in the illustration

inclosed by cover plates held by thumb nuts. A peculiar feature of the motor construction is the transverse shaft at the front end driven by a helical gear from the camshaft gear, and operating at its left end the centrifugal water pump and at the opposite end the ignition distributer. More will be said of this distributer later.

The four-cylinder motor has three main bearings, while the six has four. The following table of principal motor dimensions will bring out how closely the two power plants correspond:

Four-Cylinder Motor

Crankshaft Bearings:

Front—1⅝ inches diameter; 2 15-16 inches length.
Two center—1 11-16 inches diameter; 2½ inches length.
Rear—1¾ inches diameter; 3½ inches length.
Valve Diameter—1 13-16 inches. Valve Lift—¼ inch.

Six-Cylinder Motor

Crankshaft Bearings:

Front—1⅝ inches diameter; 2 15-16 inches length.
Two center—1 11-16 inches diameter; 2½ inches length.
Rear—1¾ inches diameter; 3½ inches length.
Valve Diameter—1 13-16 inches. Valve Lift—¼ inch.

The motor lubrication is unaltered and is a combination force-feed and splash system, the oil being circulated through to the timing gears and over the connecting-rod bearings, while the splash from the troughs takes care of the cylinders and other motor bearings. A steel plunger pump is a part of the system, and its efforts are indicated by a sight feed on the dash. The crankcase reservoir has a capacity of 4 gallons for the four and 7 gallons for the six.

Wagner Starter and Dynamo

The electric cranking, lighting and ignition problems have been solved in a different way than this year. Though still made by the Wagner company, the generating and cranking parts are now modified so as to be separate and distinct units. This year a single-unit arrangement, connected with the driveshaft by means of a silent chain is used. The new generator is placed on the left and is driven noiselessly by a shaft and pinion in mesh with the camshaft gear. The generator revolves at 1.5 engine speed.

The electric motor on the right connects to the crankshaft by a roller clutch, chain and sprockets. A simple pinion gear reduction, incased within the unit together with the chain sprockets results in a gear ratio of about twenty to one. That is, in the gear part of the drive there is a reduction of five to one, while the sprockets reduce the result four times, giving the cranking motor its speed of twenty times the engine speed.

This double reduction is a more efficient and better installation than the single method, according to the Studebaker engineers. Another point is that it is hard to get a single reduction of this amount due to the lack of space. The speed of cranking a six-cylinder motor is 65 revolutions a minute, while a four is spun at 85. These figures apply to reasonably stiff engines and when the parts have all been well worked in, the cranking speed naturally increases somewhat. For cranking, the current draw is about 100 amperes.

Battery Charging Control

The cranking apparatus is engaged through a plunger under the heel of the driver. The roller clutch engages the motor and engine automatically for starting, and as soon as the engine operates on its own power, the connection is automatically broken by this roller clutch. Since the clutch is located in the sprocket on the crankshaft, as soon as the engine is operating, the whole chain mechanism and gears are brought to rest—a feature which makes the mechanism noiseless.

The storage battery is a 6-volt Willard 100 ampere-hours capacity. It is hung from the chassis under the front seat. The

battery charges readily when the motor is revolving at a speed equal to a car speed of 10 miles an hour on high gear, and the charging rate reaches its maximum at 20 miles an hour. Since the generator is a shunt-wound type of special design, the armature reaction above 20 miles an hour cuts down the charging rate and prevents overcharge. A reverse-current cutout is also provided which prevents the battery from discharging back through the generator.

Even distribution of weight is also secured by the balancing of the two units, one on either side of the power plant. The complete system weighs less that that of 1913. The generator, including its relay and gear reduction weighs 30 pounds, and the electric motor and its reducing mechanism 35.5 pounds.

Auxiliary Ignition System

An important change is in the method of ignition. Heretofore a dual system using a magneto has been employed, but with the new Wagner apparatus, the generator has demonstrated to the satisfaction of the Studebaker engineers that it is capable of furnishing ignition current as well as providing energy for cranking and lighting. Accordingly, the current from the storage battery passes through a step-up coil placed at the front and under the hood, and is then timed by a Remy distributer, driven by the transverse shaft as already mentioned. This distributer is similar to that used with the conventional magneto.

Roller Bearings Introduced

The effort towards increased efficiency is noted in a liberal use of Timken bearings, which, in several cases, have displaced bearings of other types. There are two of these bearings to each front hub—a new design feature for Studebaker cars—and one has been added on each side of the differential, the latter making possible delicate adjustment of the ring gear and pinion. A large Hyatt bearing has replaced the plain bronze type formerly used between the forward main driving shaft and the pinion shaft in the gearset.

The clutch shows several improvements and is larger in both models. Instead of bearing simply on a shoulder, it moves by engagement of two grooves and rings. Lubricant is from a greasecup on the H-plate, communicating by a flexible steel tube, as shown in the illustration below.

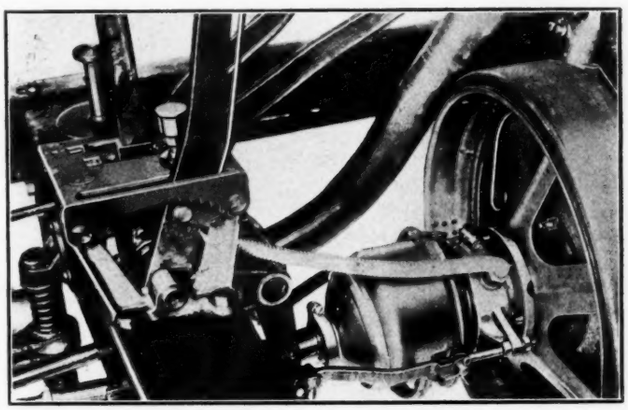
The driveshaft has two universal joints and is paralleled by a torque arm provided with a spring mounting to the frame cross member at its front end.

The Spring Suspension

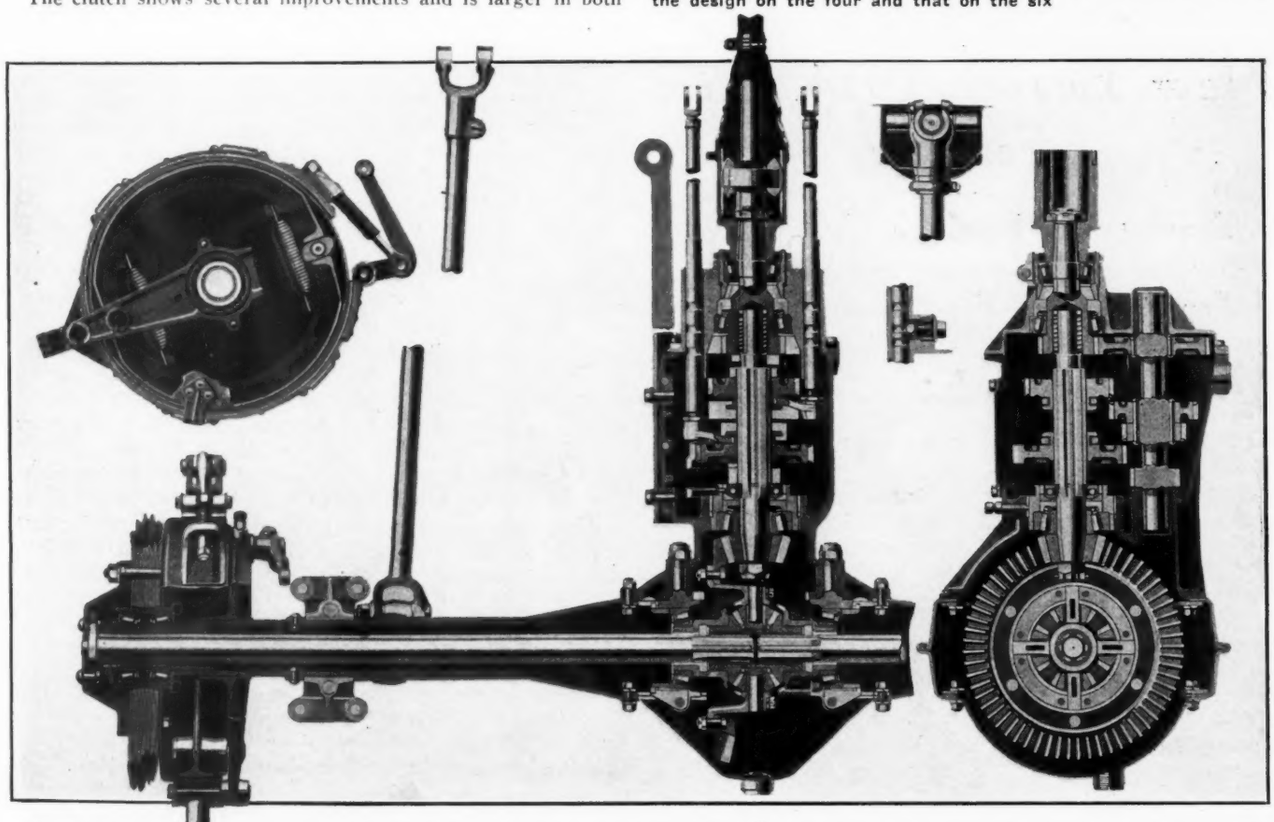
The four-cylinder car shows an important change in spring suspension. The elliptic rear springs are underslung allowing additional dip and permitting the use of a more flexible spring than is possible with the conventional equipment.

The six uses three-quarter elliptics overhung. The spring sizes follow:

Four	Six
Front: 38 by 2 inches	Front: 38 by 2 inches
Rear: 40 by 2 inches	Rear: 50 by 2 inches

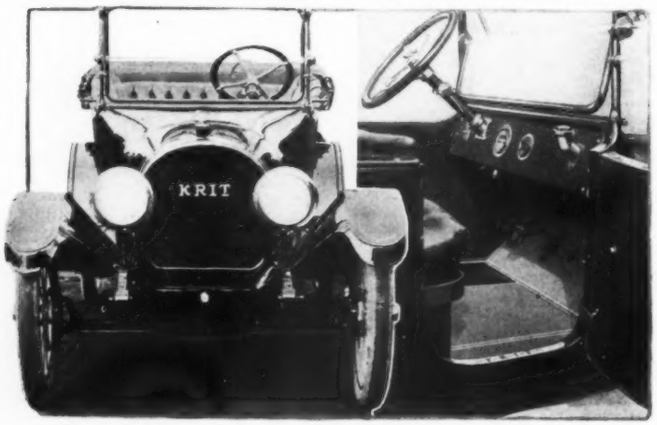


The new clutch trunnion lubricating system employed in the new Studebaker car. Dimensions constitute the only difference between the design on the four and that on the six



At the upper left is shown the brake drum used on the new Studebaker. At the bottom and center is a cross section through the rear axle, gearbox, brake and hub of the new Studebaker. At the right are shown sections of the universal joint, shifter rod and vertical section through bevel gear and gearbox

Five-passenger Krit touring car selling for $950 with standard equipment and for $1,050 including Disco electric system



At the left—Front of new Krit, showing rounded radiator. At the right—Control features of the new Krit. On the instrument board the head and tail light buttons are shown at the left, while at the right of it are the headlight dimming switch, adjustable steering column bracket, Stewart speedometer, Bosch magneto switch and the fuel tank filler pipe. A carbureter control lever and electric horn button are mounted on the steering column

New Bodies 1914 Krit Feature

Touring and Roadster Type Have Streamline Appearance and Rounded-Top Radiator—Few Chassis Changes

WITH an entirely new dress the Krit Motor Car Co. is offering for 1914 touring car and roadster types on practically the same four-cylinder chassis mechanically as now used. But this chassis has been fitted with so radically different bodies that its best friend would scarcely know it. The new dress, however, is easily the best and most stylish with which the Krit has ever been clothed and puts the car to the front as one of the representative low-priced models of the new season. The body design is of the latest streamline type, and beginning with the rounded-top radiator, the line is unbroken to the rear. The hood with its rounded top slopes rearward and meets the cowl smoothly, the latter expanding into the body in up-to-the-minute fashion. The sides of the tapering bonnet are provided with diagonal vents, lending a distinctive touch. Fenders, too, are in accord with the latest style, conforming rigidly to the curve of the wheels in the rear and breaking away from this wheel-curve somewhat in front.

Other refinements pervade the entire body construction and give a finish to the job. Wide doors with concealed hinges and handles are used, and whereas on the present model there is no door on the drive side, the new Krit, due to the front seat position, permits entrance from either side. The inside of the body is leather lined. The corrugated pressed steel running boards have also disappeared and in their place appear the cork-linoleum covered type.

Gasoline Tank Under Cowl

A striking new feature of the 1914 Krit is the placing of the gasoline tank under the cowl, a construction which is becoming popular in this country. The filler is on the right of the leather-covered instrument board. The tank holds about the same amount as does the under-the-seat type used at present, 10 gallons for direct use, and 2 gallons in reserve.

Also, to carry out the streamline appearance, no side lights are fitted, the head lamps being used alone. The wiring is such that these lights may be switched into series for a dim light for city driving, while the switch also may be operated to give parallel wiring for bright glow.

Though retaining its general constructional features and dimensions, the Krit motor has undergone some refining in order to reduce the weight of the reciprocating parts. This allows 25 per cent. increase in the motor speed, or from a maximum of 2,400 to 3,100, approximately. The result is a much quieter engine, vibration being greatly reduced.

The cylinders are L type, cast in block, have a bore of 3 11-16 and a stroke of 4 inches, giving a total displacement of 176.7 cubic inches. Valves are all on the right. The gearset in unit with the engine, is a three-point support type. There is a single support at the front end, while integral crankcase arms run out to the side frame rails at the rear of the engine.

Thermo-Syphon Motor Cooling

Intake and exhaust manifolding is on the right. The placing of the gasoline tank under the cowl allows the carbureter to be raised somewhat and this results in a somewhat shorter intake manifold. Since thermo-syphon cooling is employed, a large water outlet manifold having a 2-inch diameter is used. The water inlet pipe is on the left side and connects to the water jacket at two points.

Nothing has been changed about the crankshaft, which is carried on two ball bearings. In lightening the working parts, the greatest weight has been taken off the pistons, which are of entirely new design, though of the same length. For the four pistons, the total reduction in weight is about 3.5 pounds. The top of the piston has been beveled on the edge; three rings are used instead of four; larger oil holes have been cut around the piston wall; the wristpin diameter has been reduced which makes smaller boss diameter; one set screw holds the piston pin instead of two. In addition to these factors for lessening weight, Wasson peened, concentric rings replace the formerly-used eccentric type. These are made shallower and not so wide without reducing their strength, which could not be done with the other rings. Another weight-reducing factor comes in due to the decreasing of the wristpin diameter from 1 inch to ¾ inch. This is the lightening of the upper end of the connecting-rod. Still another evidence of refinement is found in the lower connecting-rod bearings. These were formerly of poured babbitt type, but in the new motor bronze-backed babbitt is used with shims.

A different profile has been given the cams so as to increase the efficiency of the gas entrance and exit from the cylinders. The lift of the valves is still 9-32 inch. Spiral timing gears are used.

Flywheel Oiling System

Oiling of the motor is rather unusual in that the flywheel is used as the pump to elevate the lubricant so that it can run down to the troughs and timing gears. A 1-gallon reservoir is carried below the crankcase, and the lubricant is conveyed from it back to the lower part of the flywheel housing. The flywheel rim dips into this supply of oil as it revolves and carries the oil up, throwing it off by centrifugal force into a cup from which it is piped into the crankcase troughs. Thence it is splashed by the connecting-rod ends into the cylinders and to the bearings. Drain holes

at the proper lever return the oil to the reservoir. Oil from the flywheel housing is also carried back to the gearset by a spiral groove in the clutch shaft.

Disco Cranking and Lighting

The electrical equipment which is fitted to the new Krit consists of a Disco cranking and lighting outfit, from which the Bosch ignition system is entirely separate and distinct. Bosch fixed-spark ignition has been superseded by the variable spark variety with the magneto located on the right side of the engine and shaft driven.

The Disco generator and cranking motor of the so-called double-deck type are used. That is, although motor and generator are really separate, there being an individual armature for each, they are housed integrally, the generator portion being above the motor. The unit is mounted on the left side of the engine close to the flywheel. The connection to the engine is through gears for both parts, a spiral gear on the end of the armature shaft of the cranking motor meshing with a similar gear attached to the flywheel. Inside of the top gear there is a roller clutch which releases after the engine has started so that the train of gears stops running after cranking and at the same time no gears have to be thrown in to engage engine and motor. The reduction between the engine and its cranking motor is 21 to 1, while the generator is driven at twice engine speed.

This Disco installation is of the 6-volt type and works in connection with a 100 ampere-hour Willard battery hung on the right side of the chassis under the front floorboards. This battery is capable of giving out 7½ amperes for 10⅔ hours. Suitable switches prevent the overcharging of the battery and provide for the lighting of the lamps direct from the battery when the engine is not running to drive the generator. A reverse current cutout is also provided which prevents the battery from discharging back through the generator.

The generator starts charging at a motor speed of 700 revolutions a minute and reaches its maximum output at a car speed of about 10 miles an hour on direct drive. The electric motor, drawing in the neighborhood of 100 amperes current, cranks the engine at a speed of 120 revolutions a minute, which is somewhat faster than the average rate of spinning a motor. This, of course, applies after the engine has been "limbered up." The weight of the combination motor and generator is 75 pounds including the integrally-housed gear reductions.

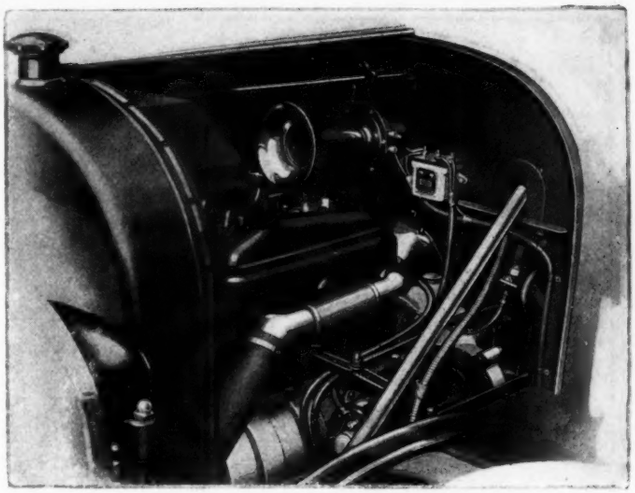
Non-Gripping Clutch Feature

Housed with the flywheel is the disk clutch which is said to incorporate a patented feature preventing grabbing. Instead of several springs around the clutch shaft to hold the clutch collar, the Krit clutch has a single large spring on which the collar floats, giving equal tension all around and preventing unequal engagement of the different part of the plates. In this clutch there are ten saw steel driving disks and eleven driven disks.

The gearbox bolted to the flywheel housing contains chrome-nickel steel gears. Three speeds are afforded. Back of the gearset, the power is transmitted to the rear axle by a vanadium steel driveshaft inclosed within a torque tube. At its front end, this propeller shaft is provided with a Spicer universal joint which is also inclosed.

The drive is taken by the torsion tube and rods. The axle is unchanged in design, being a semi-floating type. Hyatt roller bearings are used with a ball thrust bearing on the drive pinion. External contracting service and internal expanding emergency brakes have a diameter of 10 inches and a width of 2 inches.

The spring suspension has come in for no alteration, the front springs being the standard semi-elliptic type and the rear being elliptic with scroll rear ends. These rear springs are underslung from the rear axle as in the past.

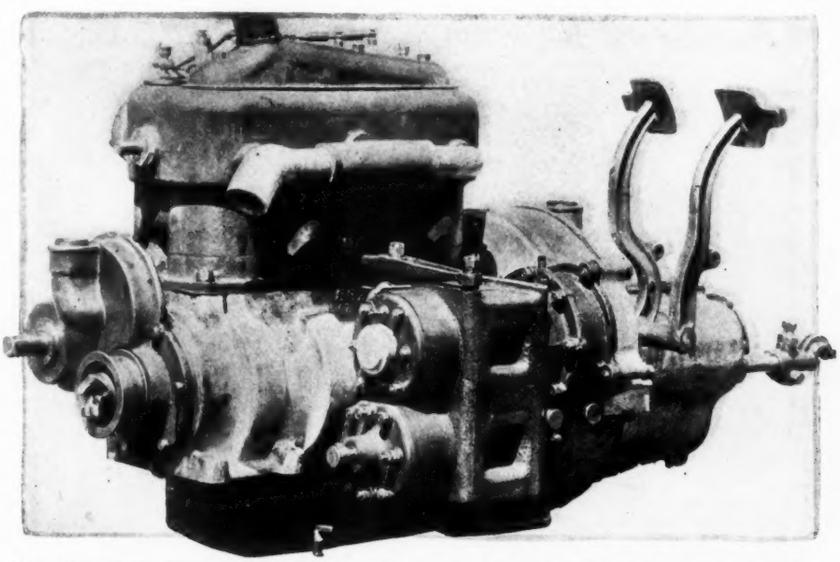


Left side of Krit motor, showing mounting of horn on radiator brace and installation of Disco electric system

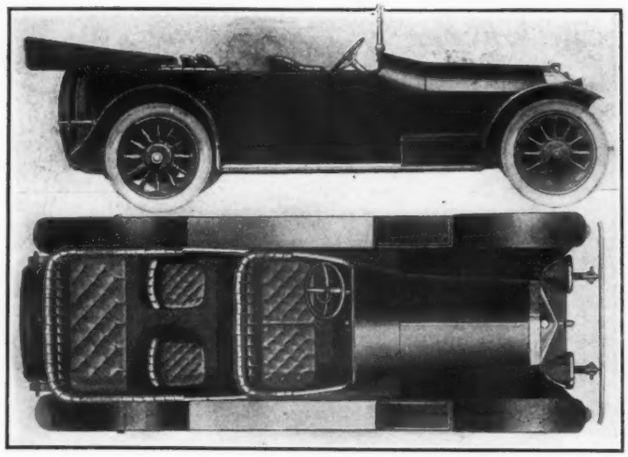
Left drive and control are retained, the steering wheel diameter, however, being increased by 1 inch to 17 inches. A unique feature in connection with the pedals is the placing of a corrugated metal pan under them so that, in driving, the heels rest in this pan and slipping is prevented. This pan is about 10 inches square and sets down into the floor board 1 inch.

Price Same But More Equipment

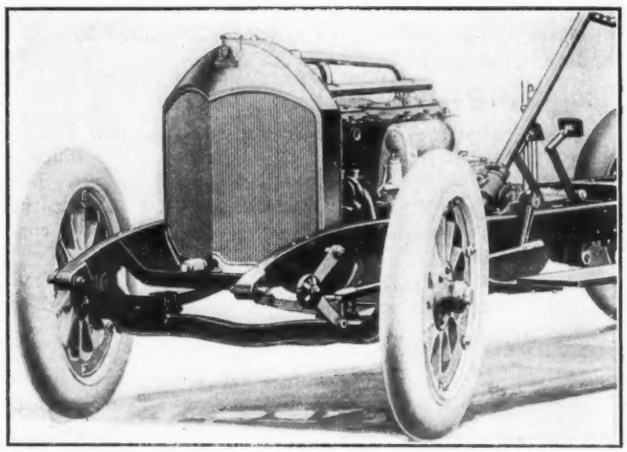
The price is about the same as that of the present model, but it includes very full equipment. For either touring car or roadster model $950 is asked, this covering everything except the Disco electric cranking equipment. When the latter is fitted, the additional cost is $100. In either case the standard equipment includes a mohair top, quick-acting curtains, top boot, double ventilating and rain vision windshield, Stewart flush-type speedometer set into cowl board, electric horn under hood, full lighting apparatus, robe and foot rails, demountable rims with one extra, 100 ampere-hour Willard storage battery, tire carrier at the rear, tools, jack and pump. The tires are 32 by 3½ inches as at present.



Mounting of the Disco motor and generator on the left side of the Krit engine for 1914. Note large water connections employed on account of thermo-syphon cooling



Top—Side elevation of Pathfinder Six for 1914. Bottom—Plan view showing seating arrangement for six passengers



Three-quarter front view of Pathfinder chassis showing the new V-shaped radiator

New Pathfinder Has V-Radiator

Six-Passenger Six Has 40-Horsepower Motor, Streamline Body, Dry Plate Clutch and Four-speed Gearset

A NEW 1914 six is the Pathfinder built by the Motor Car Mfg. Co., Indianapolis, Ind., made with 4 1-8 by 5 1-4-inch cylinders, giving a rating of 40.3 horsepower and having a piston displacement of 420.9 cubic inches. Fitted with a six-passenger body and equipped with electric horn, top, windshield, speedometer, extra rim, motor-driven tire pump and electric starting and lighting system it lists at $2,750. The chassis wheelbase measures 135 inches and 35 by 5 tires are used. The chassis characteristics include L-type cylinders cast in threes, dry plate clutch, four-speed gearset with direct drive on third and inclosed propeller shaft to a floating axle. The steering wheel is on the left side, control levers are centrally located and the dash contains the gasoline tank. The body is a streamline effect with V-type or pointed radiator and is fitted with combined side and headlights in the body of the headlights thereby giving a graceful transition from the hood to the body at the cowl without lamps to interrupt it.

The small over-all dimensions and the use of a V-shaped radiator make it possible to place the motor under a 39-inch hood. A gas passage cored inside each block allows the use of a simple V-shaped, hot-water-jacketed intake manifold.

The valve mechanism is situated on the right side of the motor and is totally inclosed by two aluminum covers, each of which is held in place by a wing nut. A pair of vents in each cover plate act as breather openings to the crankcase. Hence, the valve stems and tappet rods practically operate in a spray of oil and are exceptionally quiet.

Two Plunger Oil Pumps

Two positive plunger pumps, operated by camshaft eccentrics on either side of the middle camshaft bearing, force oil under pressure to the timing gears and bearings. This oil drains back into the splash section, which is divided by walls into four separate compartments, naturally preventing the oil from running to either end of the motor when on grades. Dippers assure a feeding of oil to all cylinders. A float indicator in an accessible place registers the amount of oil.

The electric starter is mounted with its armature in line with the pump shaft, which is connected to the engine crankshaft through a silent chain. An over-running clutch and Gray patent reduction gearing serve to connect the starting motor when its services are required. The electric generator is mounted on top of the starter and held in place by a strap. It is driven from the pumpshaft by a small silent chain.

The wiring system is of the grounded return type using only one wire to each bulb. This necessitates the use of fuses in the switchbox, which are easily replaceable because of the position of the switch on the front of the dash. An unusual feature of the wiring system is the use of a secondary junction block in the left-hand channel of the frame, directly opposite the battery box, which is situated on the left-hand running board. The feed wires from the battery come directly to the junction in the frame. All the wires to the lamps terminate in this same junction block. These wires are a part of the chassis, and are securely clamped onto the channels of the frame so that they will neither shake loose nor chafe. A steel tube held in suitable clamps carries the wires direct from the switchbox to the junction block, and is the only wiring on the body. The side lamps have been replaced by a pair of 4-candlepower bulbs situated in the upper portion of the parabolic head lamp reflectors. On account of their position they give a good light on the road for their small candlepower. The head lamp brackets are castings fastened to the side rails of the frame. They have hollow uprights, and the feed wires come up through this hollow bracket to the back of the lamps. Hence they are unnoticeable from the front of the car.

Adjustable Clutch and Brake Pedals

The clutch and brake pedals are adjustable by means of a pinch bolt which passes through the pedal arm, the pedal pad being mounted on the end of a rod which slides through a suitable slot in the end of the pedal arm. The accelerator pedal moves in a transverse slot in the toeboards and operates the throttle through a pair of bevel gears and a cross shaft fixed upon the crankcase, interconnected with the throttle at the carbureter on the opposite side of the motor. The spring is wound around the cross shaft and works in torsion. Its length makes its tension nearly uniform.

The control levers project through the floorboards at the middle of the car. The change speed lever is the walking stick type with ball handle. The ball-and-socket joint upon which this lever operates barely projects through the floorboards, and its lower end engages directly with the shifter rods in the gearbox. The emergency brake is pivoted on the side of the transmission case, and its ratchet is placed below the fulcrum instead of above, thus transferring the quadrant to a position below the floorboards.

The drive from gearset to rear axle is through two universal

joints, one of which is inside the torsion tube, next to the bearings which support the pinion shaft. Under full load the tube is nearly horizontal, so that a practically straight line drive is obtained. The bevel gear reduction is 3 3-4:1.

The rear axle is a floating type. Both emergency and running brakes are placed in the wheel drums and operate by rods inside of the frame, as may be seen from the plan view of the chassis at the bottom of the page.

The frame is of open-hearth steel, with a maximum section of 5 inches. It has a 6 1-2-inch kick up at the rear and a gradual upward curve at the front. This shape requires large forgings for the front spring hangers, which also support the adjustable bumper. The front springs are semi-elliptic, 39 by 2 1-4 inches. Rear springs are three-quarters elliptic underslung, the lower members being 54 by 2¼ inches, shackled at each end. The underslinging of the rear springs has an appreciable effect in lowering the body and the center of gravity of the car and thus increasing the factor of safety as regards turning turtle, as well as giving a lower and more compact appearance.

Fuel Tank Under Instrument Board

An instrument board is used and under it is the 18-gallon gasoline tank. This location of the tank has been necessitated by deepening of the front seat upholstery and lowering the center of gravity of the car. The carbureter can thus be placed closer to the cylinders in order to reduce the unheated area of the intake pipe and thereby eliminate condensation of the gasoline. The mounting of the tank is unique. Two brackets are placed at the lower forward corner of the tank. These are riveted onto the tank and fastened to the uppermost toeboard. The major portion of the tank weight is carried upon these. Near the top of the tank two heavy tubes are inserted. These pass from front to rear and through both vertical walls of the tank. Through each of these pass rods which serve to clamp the upper portion of the tank securely against the dash board. On account of the tube being about twice the diameter of the rod considerable flexibility is obtained in this mounting. Furthermore, the pull on these rods is taken on the surrounding tube rather than upon the walls of the tank which such tightening would tend to bend. The tank is so designed that it may readily be removed after the instrument board has been taken out, and the removal of the instrument board is not a difficult operation. The filler opening is at the right end of the instrument board, rendering it very easy to replenish the supply of fuel without having to clamber all over the car.

Instrument Board Easily Removable

The instrument board construction consists of a 3-4 by 3-8-inch channel steel member crossing the back end of the cowl, and electrically welded into two castings which form the back corners of the cowl and serve to support the windshield. The instrument board is held in place by four nickel-plated cap screws passing through metal plates set into the instrument board and screwing into jigged holes in the steel cross member of the body. This makes every instrument board interchangeable and easily removable. The board carries the gasoline filler, ammeter, 8-day clock, ignition switch operated by a Yale key, a light switch and speedometer as well as a bracket which supports the steering column. The speedometer is driven from the forward universal joint behind the transmission. The handle for the light switch is located at the left end of the instrument board and the switch is placed on the dashboard under the hood. They are coupled together by a short cardan shaft.

Tool Box on Right Running Board

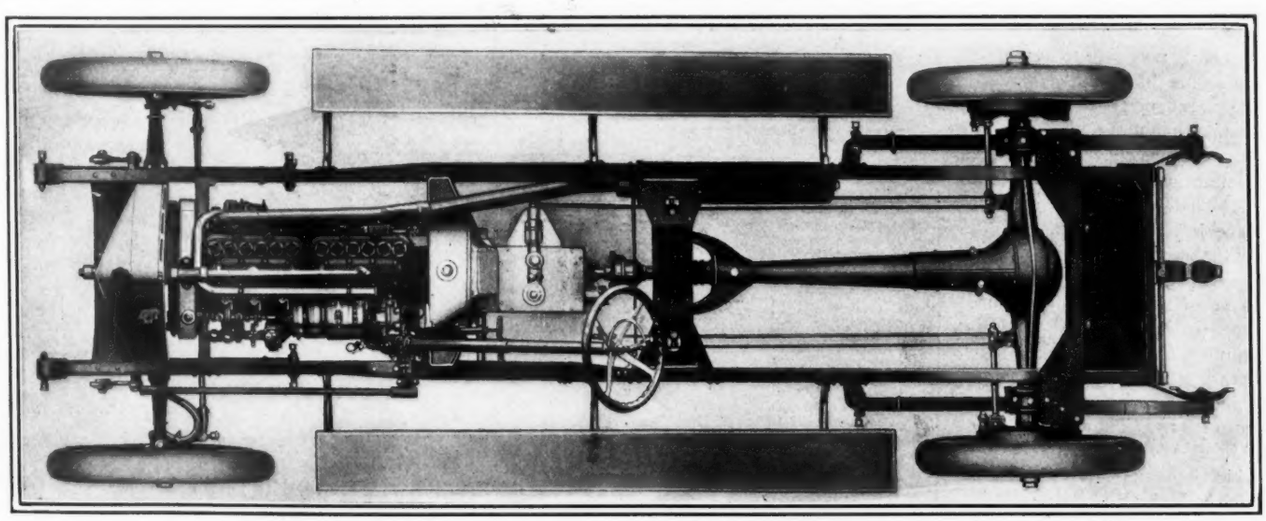
The limited carrying space which is left where modern deep cushions are used has been augmented in this model by placing a box for tools and other articles on the right running board, corresponding to the battery box on the left side, and a special carrying box under the rear of the frame. This is waterproof and is accessible upon lifting the rear cushion. In the chassis view at the bottom of this page this compartment may be seen at the rear of the frame and just before the tire carriers.

The single piece windshield can be folded down over the cowl or turned to a ventilating position. Its arms project upward to form a means of anchoring the front end of the top securely without the use of straps. This construction is the same whether the top used is the one regularly furnished or the Golde one man top, which can be had on special order.

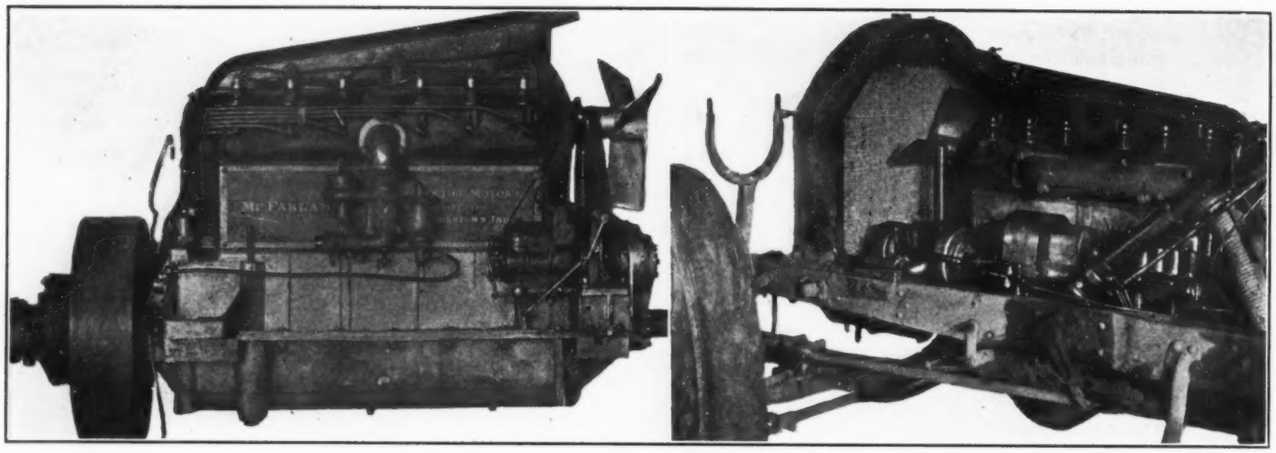
Power Plant Supported On Brackets

The brackets for supporting the power plant are shown in the chassis view below. The rear brackets are made double with a short bar of steel across two strong bosses. The motor supporting arm is bolted down at H, and can be dropped without moving forward or backward upon the removal of a bar. The front support is upon a cast steel cross bar, resting on brackets, which are made narrow so as to allow of lowering the front end of the motor after the rear end has been lowered and the whole pushed about 1 1-2 inches to the rear. The rear of the motor is too close to the dash to allow of sliding the motor to the rear without lowering it, but this construction makes it possible to remove the motor without difficulty.

The cellular radiator is V-shaped, extending 6 inches further forward at the center than at the sides. It is surmounted by a conical tank, and the support is by brackets which extend back of the lower tank, so that bolts rather than studs are used for its attachment.



Plan view of the six-cylinder Pathfinder chassis, showing inclosed propeller shaft acting as torque tube and strongly-braced frame



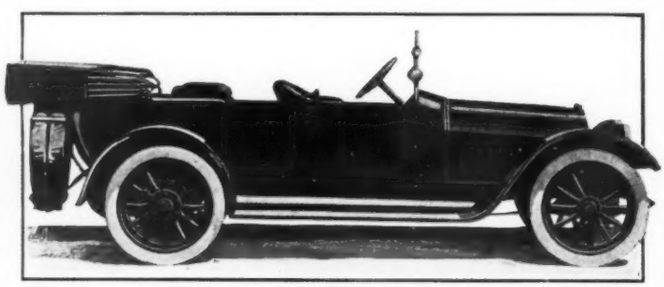
At the left—Intake side of McFarlan six motor showing Stromberg double-jet carbureter and Deaco generator for lighting. At the right—Exhaust side of motor showing location of Mea magneto and flexible exhaust manifold connection

McFarlan Concentrates on Six for 1914

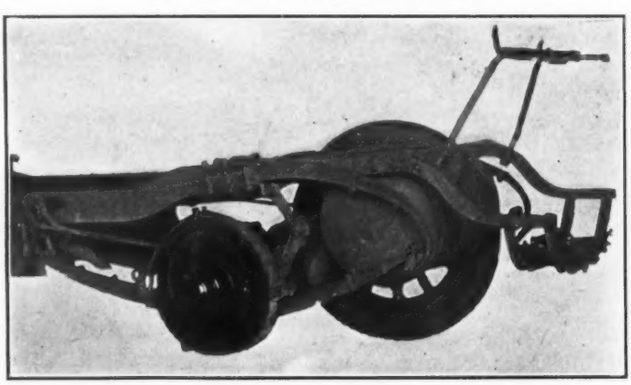
Left Drive and Center Control Adopted and Wheelbase Lengthened from 124 to 128 inches—Larger Bodies

FOR 1914 the McFarlan Motor Car Co. has brought out the improved series T. This is a six-cylinder car and is made up in but one chassis model which will constitute the entire McFarlan line for this season. Outside of making only one chassis for 1914 the following new features will be seen in the McFarlan: It will have left drive and a wheelbase 4 inches longer than in 1913, this car having 128 inches instead of 124. Elliptic rear springs have been dropped and in their place a three-quarter elliptic will be found. The radiator is now supported on trunnions in place of the plain bolts. Spicer universal joints are used and a Mea magneto. The gasoline tank is now of seamless steel, the air tank of the starter is larger, the bodies are larger and a new four-passenger coupé has been added. Among the mechanical changes may be mentioned the all metal air pump which has been added, elimination of dash lights and the ball bearing steering knuckles.

A glance at the exterior of the McFarlan motor shows it to be of the six-cylinder block type. It is supported at four points. The bore of the cylinders is 4 inches and the stroke 6 inches, giving a stroke-bore ratio of 1.5. The cylinders are T-head and have waterjackets which completely surround each cylinder and pass over its head. The entire design is compact with a short overall length of motor which should tend to give a rigid and stiff crankshaft. The cylinder and piston castings are of gray iron. The connecting-rods are of I-beam section, forged and heat treated. Together with the pistons and other reciprocating parts, they are weighed before assembly for balancing purposes. The crankshaft is 2 inches in diameter. It is carried upon four main bearings which are bushed with metal die cast from nickel babbitt. The end bearings are 4.5 inches in length and 2.125 inches in diameter. The middle bearings are 1.875 inches long and 2.375 inches in diameter.



The new six-passenger McFarlan six



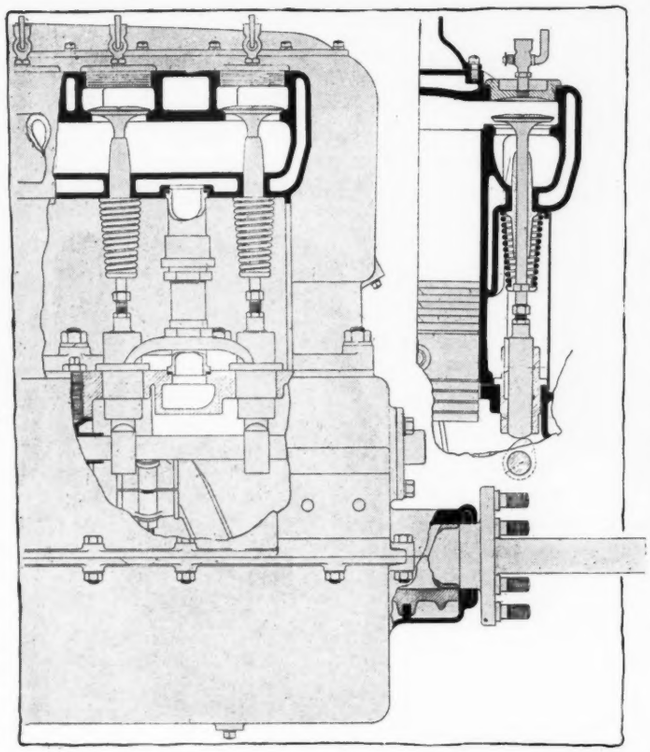
New three-fourths elliptic spring on McFarlan six

The valve action is driven by helical gears contained in a case at the front end of the motor. These gears transmit the motion through a rigid camshaft to the valve followers and valve stems. The valves are inclosed in cover plates which extend the entire length of the block casting and which can be removed in a few moments by a screwdriver. A study of the valve mechanism in the accompanying illustration will show the customary tappet adjustments and spring seating. A point worthy of note, however, is the long valve guides which measure 3.75 inches from top to bottom. The width of the valve port is 2.25 inches at the widest extremity and 2 inches at the narrower extremity. As will be noticed from the sectional illustration, the waterjacket space extends well

around the valve guide. The cams act directly on curved push rods which are an integral part of the valve lifting mechanism. The diameter of the camshaft is 1.875 inch, while the diameter of the valve stem is .375 inch.

The oiling system used on this car is the circulating splash. The oil is carried in the lower half of the crankcase. From there it is taken by an oil pump and finally deposited in a series of splash troughs located below the connecting-rod. On their downward sweep the scoops on the end of the connecting-rods dip into the oil and throw it up into the cylinders, turning it into a spray which amply lubricates all the internal motor bearings.

Excess oil again reaches the crankcase reservoir after having passed through the overflow pipes which connect that section of the crankcase carrying the splash trough with the reservoir below. The gasoline supply is carried in a 22-gallon seamless steel tank located on the rear of the car. The gasoline is fed by pressure taken from a small cam action pump on the motor. A Stromberg double-jet carbureter is used. The clutch is a multiple-disk type, running in oil.



Part sectional view through McFarlan six motor, showing valve mechanism. At the right—End section through same

Electric equipment consists of a Mea magneto for running current and a Deaco electric lighting system. The Deaco generator is of particular design and is so arranged that it runs at the same speed as the crankshaft. The generator is connected up with a Vesta battery, which it starts charging at a car speed of 6 miles an hour. At that speed the generator delivers about 3 amperes. A study of the generator curves shows that it reaches its maximum deliveries at a car speed of about 20 miles per hour when it will deliver 15 amperes. From this point the output curve will drop, becoming flat at 12 amperes and continuing at this reading throughout the remaining range of car speed. The headlights in use with this system each draw 2 amperes. The side and tail lamps each draw one half ampere. This gives a total of 5.5 amperes. The generator will carry the entire lamp load at a speed of 12 miles per hour, while at 15 miles per hour the generator will more than double the lamp requirements, furnishing 12 amperes.

For starting a pneumatic outfit is fitted. This is in line with McFarlan policy for the past 3 years. This year, however, it has been improved by increasing the size of the air tank. This system uses an all metal four-cylinder Lipman pump to supply pressure. The air is forced into a 10 by 40 inch seamless steel tank in which pressure up to 300 pounds may be carried. It is stated that with a pressure of 250 pounds in this tank the starter will spin the 4 by 6 motor at the rate of 200 revolutions per minute for 85 seconds.

Gearset is located on the rear axle, and the housing is integral with the differential housing. The gears are composed of 3.5 per cent. nickel steel and the shafts are also of nickel steel. The sliding gearshaft is splined to hold the sliding gear rigid in any position. On direct drive the power is transmitted through the main shaft to the differential pinion, giving a 1 to 1 gear ratio without driving through any intermediate gears. The gear ratio on high depends on the reduction in the rear axle and this can be made to suit the locality in which the car is to be used.

Drive is taken through a propeller shaft and bevel gears. The driveshaft is surrounded by a torque tube which is braced by a large head yoke. Flexibility of drive and compensation for varying weights carried in the car is taken care of by a Spicer double universal joint on the driveshaft.

Rear axle is a floating design which supports the weight on the axle housing and transmits the drive from the axle shaft to the wheel by means of a flange on the axle shaft and through bolts which connect the flange to the wheel. The wheels are all

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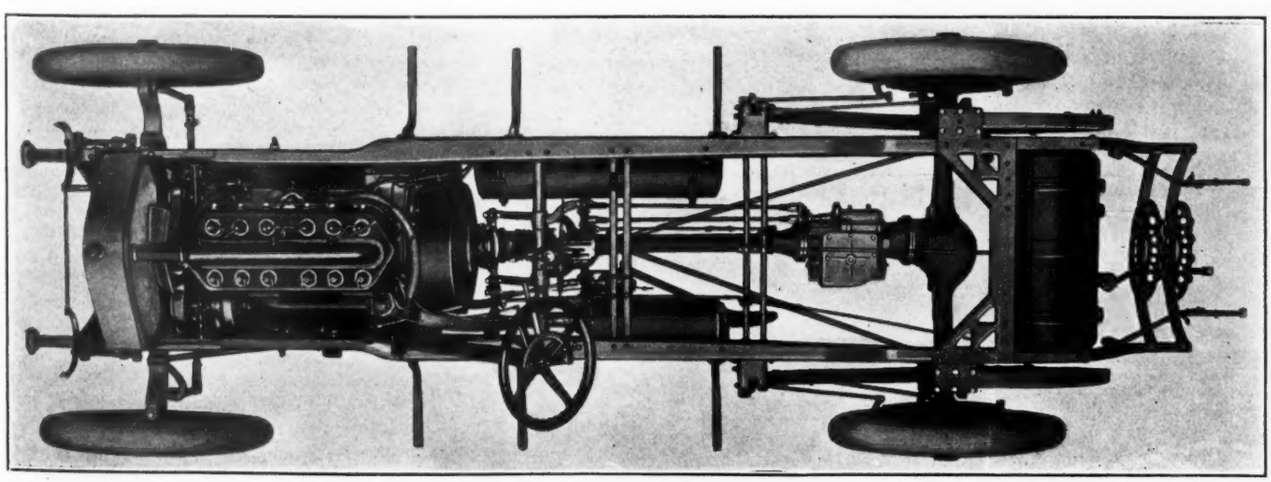


Plan view of 1914 McFarlan six chassis, showing gearbox integral with the rear axle tank for air starting system and tire carriers at rear

The Engineering Digest

Features from 5-Horsepower Bugatti Car An Example of Light Fast Vehicles Combining Sport and Economy

While Different in Nearly All Important Details of Construction From Other European Small Cars Which Are Bidding for Public Favor On the Strength of Economical Upkeep, Bugatti's Production Shows, on Closer Examination and by the Mention Accorded It, That Ample Power and Fair-Sized Bodies Probably Still Have Charms for European Motorists Though the Power Must Be Generated Economically in High-Speed Motors and Rated Deceptively Low

AMONG the many cars of recent manufacture which are listed as very small, three models made by Ettore Bugatti at Molsheim, Alsatia, are attracting much attention in Europe, partly because Bugatti is among the early designers of automobiles and for a number of years has designed parts which various prominent manufacturers used under license and partly because he has lately built powerful cars to the special order of well-known clients, such as Prince Henry of Prussia, which productions have been noted not less for their good qualities than for the originality of the design features.

The three new models are turned out at his own works, established in 1910, and all have the same diminutive "5-horsepower" motor with four cylinders of 65-millimeter bore and 100-millimeter stroke, while the three chassis vary from a wheelbase of 2,000 to 2,400 and 2,550 millimeters [79 to 95 and 101 inches] and lengths of the carriage work of 1,725, 2,125 and 2,280 [68, 84 and 90 inches], all with the same standard wheel gauge of 700 millimeters. A car with a 100 by 160 four-cylinder motor, giving 19.2 horsepowers according to the official German formula by which taxation is graded, is also made at the same works but not in considerable number.

Getting the Effect of Long Wheelbase

The pressed-steel frame of the little car is very slender except in front, where it is strongly contracted to provide direct suspension of the motor on the reaches and sharp steering, and the reinforcements extend as far back as to give also a rigid attachment for the gearbox which is extended laterally to act as a transverse. The length available for carriage work is conspicuously large for a car of so small denomination, and this effect is obtained partly by having a very short motor without any fan and partly by the nature of the rear spring suspension. The latter is arranged, as shown in Fig. 1, to give those sitting in the rear seat the comfort otherwise obtained only with a longer wheelbase. The extreme rear ends of the frame reaches are connected by a strong tube which projects on both sides, and to these projections the leaf springs are clipped, each spring being only one-half of a semi-elliptic and extending forward to the rear axle. As compared with the usual attachment of a semi-elliptic spring to a point of the frame at a given distance from the motor hood, the gain in shortening of the wheelbase is thus the full length of the half-spring, while the comfort of passengers remains determined mainly by the distances from the seat forward to the front axle and backward to the point of the rear spring attachment. Friction shock absorbers are applied between the axle and the frame.

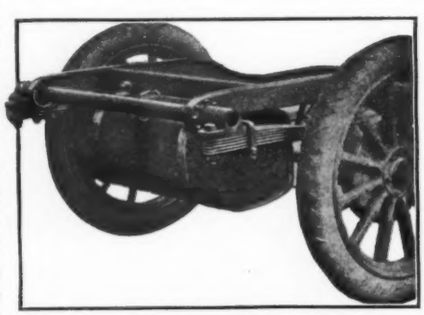


Fig. 1—Comfort for seat over axle

The cellular radiator in a rigid frame is mounted upon the front end of the frame reaches, in a manner allowing for torsions of the latter.

The 8-gallon gasoline tank is hung by steel straps from the rear cross-member, with braces to the reaches.

The edges of the dash and the radiator, where the motor hood rests, are inlaid with strips of leather to obviate all rattling of the hood.

The steering column is adjustable to different inclinations, and the steering arm is forged flat and curved, as a scythe, by which provision the use of buffer-springs and ball joints in the steering-rod are made unnecessary perhaps [the description says nothing on this point, but an illustration, not here reproduced, seems to indicate that such is the case], particularly as the steering rod runs at a considerable angle, in a horizontal plane, from inside of the narrowed frame.

A High Rigid Motor Unit

Fig. 2 gives a front view of the motor with sectional views in two different planes showing the disposal of the camshaft and valves, the drive and construction of the water pump and the pressure valve for the gasoline feed. Fig. 3 gives an exterior view from the exhaust side. The four cylinders are united in a block casting, and it is noticed that the upper portion of the crankcasing is unusually high, with the stroke portion of the cylinders extending into it. This peculiarity in shape is mainly due to the need of having the four arms on which the motor is supported in the frame more than ordinarily strong and rigid since they act also as cross-members of the frame and must be fit to resist torsion of the latter. The number of rivets used in the vertical portion of the frame reaches is reduced to a minimum, and some of the transverses are riveted to the flanges only.

Rocker Arms for Valve Action Discarded

The valves are all pending in the cylinder heads and the overhead camshaft turns in three ball bearings in the plane of the cylinder axes, running in an oilbath in a perfectly tight casing, of course. Instead of by the usual rocker arms the cam motion is transmitted to the ends of the valve stems by means of little curved and hollow pieces of casehardened steel which slide to and fro in curved guides made of bronze and white-metal bushings. Caps on the ends of the valve stems, within which may be placed thin brass shims, serve here as in some of the German aviation motors, for adjustment of the play; which should be about 1-5 millimeter. The induction valve is placed in a special housing which can be removed from above when the camshaft casing is dismounted, but the exhaust valve has its seat against the cylinder casting itself, and only its guide can be replaced

from above. To remove the exhaust valve or grind its seat it is necessary to dismount the cylinder block as well as the camshaft casing, but this unfavorable feature is offset by the better cooling of this valve and seat which can be secured when no housing intervenes to retard the action of the cooling water. This feature, too, has been demonstrated as acceptable through practice with aviation motors.

Refinements in Accessibility

Two pairs of bevel gears drive the camshaft at the lower and upper ends of a vertical shaft encased in front of the motor, and the vertical shaft is in two parts meeting at the middle in a jaw clutch, so as to facilitate the dismounting of the upper mechanism. The casing of this shaft is for the same purpose made easily dismountable, the upper portion telescoping into the lower portion and the latter engaging the crankcasing by two hook-like jaws. The rotation of the vertical shaft is transmitted through a pair of helical pinions to a cross-shaft behind it by which the magneto on one side and the centrifugal water pump on the other side are driven. The pump shaft proper is connected to this driving shaft only by a slender spline which is sheared off in case the pump is obstructed or frozen, so as to protect other parts.

The facility for dismounting these parts is pronounced. The cross-shaft runs in two ball bearings which are spaced apart by a prolongation of the hub of the nearest helical pinion. The magneto is engaged by a simple jaw clutch. The ball bearings are mounted in cups which are clamped on, and this admits of the removal of the driven helical pinion.

Two petcocks will be noticed on the centrifugal pump, one for the water and possible impurities, the other at the top for air, as air pockets sometimes interfere with the circulation. It also admits of observing the circulation directly. The method of using this vent, if air is found under it, consists in opening it, adding water in the radiator and turning the starting crank till water runs out at the vent and then closing it again.

The spark plugs are inserted in the sides of the combustion chambers immediately below the intake valves, and the condition of the valves and seats can be observed through the plug holes. The timing of the spark is controlled by a lever on the steering wheel—the only one there, the gas being regulated by the accelerator pedal alone. An ignition contact on the dash is under lock and key. At both sides of the camshaft casing four holes, normally closed by brass screw plugs, serve in conjunction with marks on the camshaft gears and on the flywheel to facilitate the observation and regulation of valve action and spark timing at the factory or after an overhauling or repair.

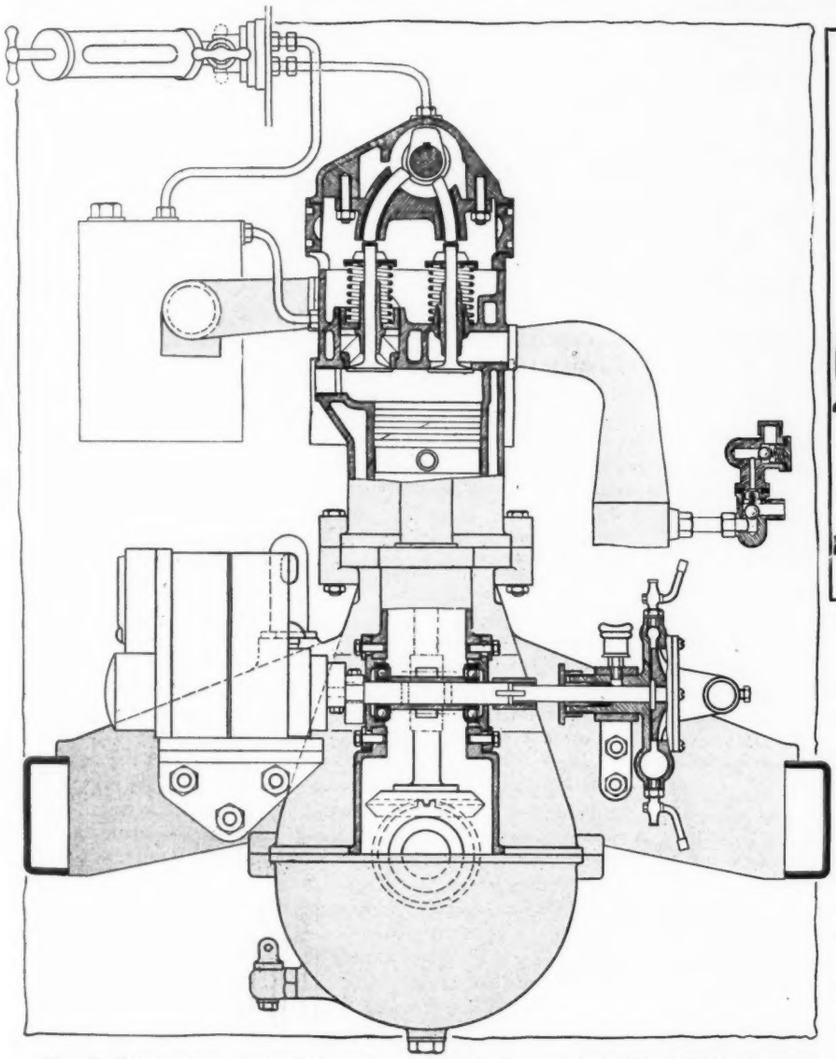


Fig. 2—Front view of Bugatti motor, with sections (in different planes) through valves and pump-magneto shaft. (Pipe taking surplus oil from above cylinder heads to overflow tank is in reality curved down; not up, as shown)

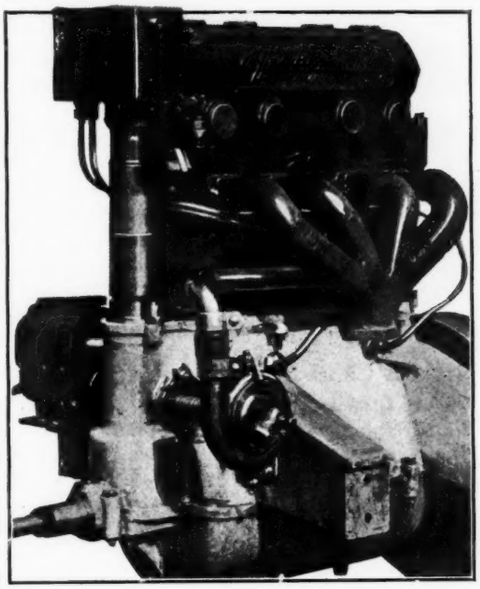


Fig. 3—Bugatti motor, exhaust side

Exhaust Manifold of Unusual Type

A special large tube from the water jacket between the two middle cylinders provides an unusually ample preheating of the Zenith carbureter. When the accelerator pedal is not actuated it automatically throttles the motor to a low speed. A filter in the gasoline conduit is combined with a stopcock, as the needle valve in the float chamber offers no absolute guarantee against leakage of gasoline at the jet. Pressure for the fuel feed is taken from the exhaust pipe and is limited by a safety valve, as shown in Fig. 2. For starting, the driver works up pressure by means of a small hand pump. A manometer on the dash registers the pressure, which should be about 1-5 atmosphere. The exhaust system differs from the ordinary in so far as all exhaust conduits from the cylinders empty into the exhaust pipe at one point, the object being to create a suction through all the conduits at every exhaust, thereby cleaning the cylinders more com-

pletely of burnt gases than is ordinarily done. The pipe, extending under the chassis on the other hand, is perfectly straight.

Oiling Demands Attention Every Day

The camshaft mechanism is oiled from an automatic oiler, visible in Fig. 3 as a rectangular box at the top of the vertical shaft. It contains the upper bevel gear for driving the camshaft and an oscillating piston pump which draws its supply from an oil tank placed in a lower position under the hood attached to the dashboard (the latter is made of two thin trussed sheets of aluminum). The flow from this pump bathes the cams and bearings and the curved valve tappets, and the surplus finding its way through the tappet guides is collected in the space formed over the cylinder heads and from here it is drained to a special tank which is indicated in Fig. 2 though not in its actual position, and from this tank it is drawn by means of a hand pump on the dash, also shown diagrammatically in Fig. 2, and is pressed back to the oiler on the front of the motor.

Oil for the crankcasing, the sump of which is divided into two compartments, is supplied by two high-pressure piston pumps with adjustable stroke, one driving to the rear and the other to the front compartment, and from these the lubrication is taken by splash. A number of grease cups are provided throughout the construction, such as for the water pump, the steering gear, the clutch, the universals and the spring shackles. To oil the spring leaves the vehicle is jacked up until the wheels begin to leave the ground. By this operation the leaves separate a little and oil can be introduced between them.

No Clutch Spring—Disks Compressed by Toggle

A few small disks, alternating sheet steel and cast iron, constitute Bugatti's clutch which works in a drum kept half-full of a mixture of oil and kerosene and is actuated by a lever mechanism without any clutch spring. A sliding sleeve on the clutch shaft acts in the manner of a toggle lever upon two bell levers, each with one long and one short arm, and in the short arm a pressure screw is nicely adjusted to the proper distance from the plate compressing the disks. The toggle remains where it is put, it seems, and is moved in or out by means of a pedal with a rather long movement, so as to make the mechanism quite sensitive and the degree of pressure which may be applied variable over a considerable range. The clutch shaft has at both ends rounded-square joints to make it accommodate itself to torsions of the chassis frame. It is not explained how it is made practicable to work a pedal both ways by foot pressure without employing a return spring.

The Real Power of the Motor

Nothing very unusual is shown in the gearbox, unless it may be mentioned that an eccentric adjustment of the secondary shaft is provided for the purpose of securing the best and most silent mesh of the gear teeth when the car gets old as well as while it is new, which is not a common provision in small cars. But here it is to be noted that the real power of the car at 3,000 revolutions per minute on the test stand is not 5 horsepowers but about 22 horsepowers, and according to its dimensions it would, even according to the official German formula, figure out 6.07 horsepowers. The discrepancy arises partly through the long stroke and partly through the enormous speed of which the motor is capable, both of which factors are not recognized in the formula. The car has actually attained speeds of 80 to 100 kilometers per hour. Similarly the 19.2 horsepower Bugatti car is equipped with a motor showing about 90 horsepowers on the stand.

The four gear speeds of the 5-horsepower car—commercial term—give a transmission ratio of 1 to 3.2 for low and reverse, 1 to 1.9 for second, 1 to 1.3 for third and direct drive for the fourth. The ratio of the bevel gear varies from 16 to 49 for the model with the lightest chassis and carriage work to 14 to 48 and 12 to 50 for the two other models, and the car speed at 1,900 revolutions of the motor shaft on direct drive varies correspondingly from 81.50 kilometers per hour to 73 and 60 kilometers, respectively.

The bearing for the long drive shaft immediately in front of the bevel gear pinion comprises one double and one single radial ball bearing as well as to two separate end-thrust ball bearings placed intermediately and also serving to insure oil-tightness, the whole bearing being very long [and of a type advertised by a German partsmaking firm.—Ed.]. The shaft has two universals and a torque rod. Upon the middle of it there is mounted a pulley from which the speed indicator on the dash is actuated by flexible tubing, and it is surmised that the arrangement also is intended to obviate the transverse vibrations likely to arise here.

Other features of these cars are more nearly in accordance with the conventions. The weight of the three chassis is approximately 350, 375 and 390 kilograms and the carriage work is arranged for respectively 2, 3 and 4 persons.—From *Der Motorwagen*, October 20, and *Omnia*, September 27.

Quartz, a Material Old as the Hills But Only Lately of Interest to the Motoring World

KNOWN as rock crystal since antiquity and at times widely employed for artistic purposes, being carved and ground with diamond dust into gorgeous chalices or ornamental figures, quartz did not become a practical material for industrial purposes until it had become possible to melt it in an electric furnace and shape it into molds. And the numerous uses which have since been found for it depended, further, upon the cheapening of the product which came only when the natural supply in the form of blocks of crystal found in various mining regions was no longer relied upon and quartz was made instead from more or less pure quartz sands and was turned out with certain alloys or impurities which increased its mechanical strength without detracting materially from its other qualities.

Quartz used instead of glass for goggles has the advantage that water and vapor do not cloud it nearly to the same extent. Rain does not adhere to it. For oil sights, sections of wind shields and the front window in closed vehicles driven from the inside this advantage is likely to become more widely appreciated than it is at present, as soon as broader competition in the production of quartz articles shall have reduced the price still further. While the best glass, such as flint and crown glass, eventually always loses a good part of its lustre and transparency from the scratching effect of dust and grit, quartz is so much harder that its properties in this respect are preserved indefinitely. It is therefore preferable for the reflectors, mirrors and lenses of headlights, and it can now be made in the required sizes for these purposes without any difficulty.

For thermometers to measure heats between 400 and 750 degrees centigrade, which is a range of considerable importance for the annealing of the steels used in automobile manufacture, quartz is now considered nearly indispensable and for the utensils of industrial laboratories it has practically displaced porcelain, as it never cracks from sudden exposure to changes of temperature and does not begin to soften till a temperature of 1,000 degrees is reached and maintained.

As an electric insulator nothing else is equal to quartz and it should therefore be an excellent substance for the insulating material of spark plugs, but it also has the peculiarity that it does not expand by heat, except to an infinitesimal degree, and as the metal part of the plug does expand, certain difficulties arise in the way of leakage between the quartz and the metal which have not yet been overcome. If the grade of nickel steel called invar, which possesses the same property of not expanding, were used for the metal part of the plug, the difficulty mentioned would not be overcome but only moved to the threaded joint between the plug and the cylinder head.

Molded quartz is superior to natural rock crystal for insulation, because the crystal is more dielectric in one direction than in another while the molded quartz with a thickness of only 1 millimeter resists a current of 25,000 volts.

Velie Adds Six and Continues Fours

Prices Same as in 1913—Six Lists at $2,350—G. & D. Starting and Generator Equipment—Pressure Fuel Feed—New Body Styles

VELIE cars for 1914 are marked by their entry into the six-cylinder field, although the four-cylinder cars, which heretofore have formed the sole output, will be the leaders. The line embraces two four-cylinder models, which are developments of 1913 chassis and a six. The 4-35 four is a development from the present 4-32 and the 4-45 is a development of the present 4-40. The six-cylinder, known as 6-50, is new throughout.

The change in nomenclature of the four-cylinder model is due to the increase in power obtained by slightly increased cylinder dimensions. The 4-35 has cylinders 4¼ by 5½ inches, an increase of ¼-inch bore, the stroke remaining the same. The 4-45 is 4⅝ by 5¼ bore and stroke, ⅛ inch increase bore over the 4-40 of 1913.

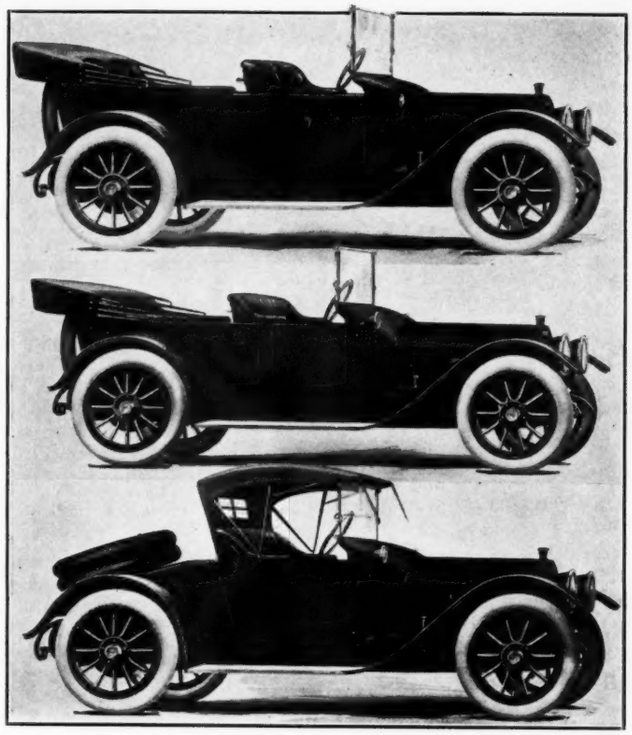
The six-cylinder has a Continental engine 3¾ by 5¾ and is the only engine not purely a Velie product.

Prices Same as 1913

Prices remain practically the same as 1913 for the four-cylinder cars. The 4-35 appears only as a five-passenger touring car of 113-inch wheelbase and 34 by 4-inch tires at $1,500.

The 4-45 and the six-cylinder car have interchangeable bodies, that is, the same bodies may be applied to both chassis, the 5 inches difference in wheelbase being due to the added length of hood of the six. These bodies are five-passenger touring car, four-passenger torpedo and a two-passenger roadster, listed at $2,000 on the four-cylinder chassis and $2,350 on the six. The larger four-cylinder chassis is 121 inches between wheel centers and has tires 36 by 4 inches. The six has a 126-inch wheelbase and 27 by 4½-inch tires.

The three chassis are characterized by certain features of design common to all, these, including L-head cylinders, Bosch dual ignition, Stromberg carbureter, Gray & Davis electric system, dry-disk clutch, floating axle, three-quarter elliptic underslung springs, left drive and center control.

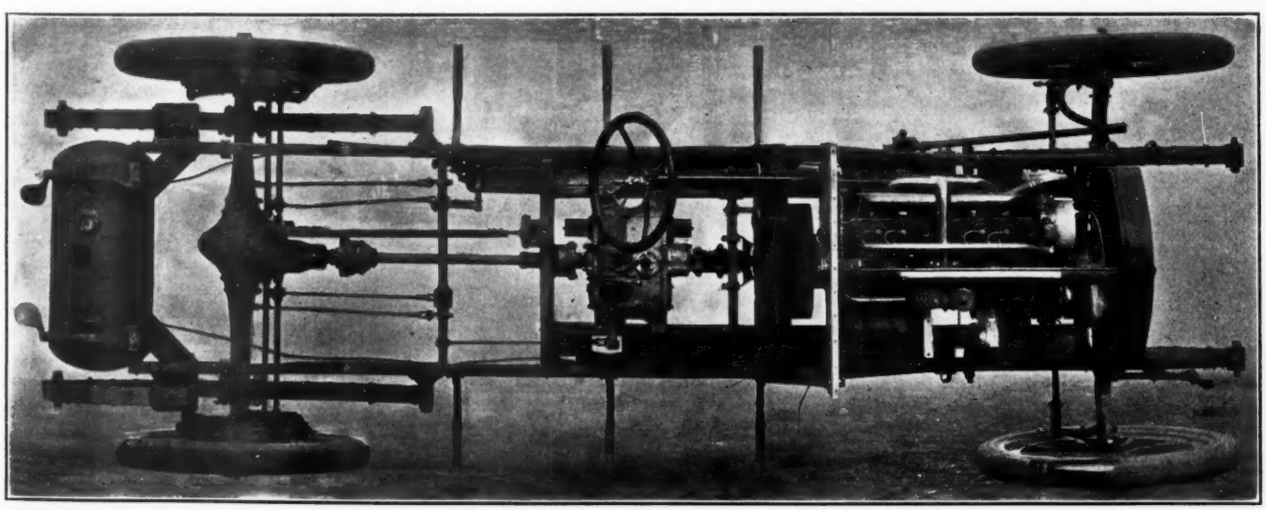


At the top is the Velie 4-45 touring car. Beneath it is the 6-50, while at the bottom is the 4-45 roadster

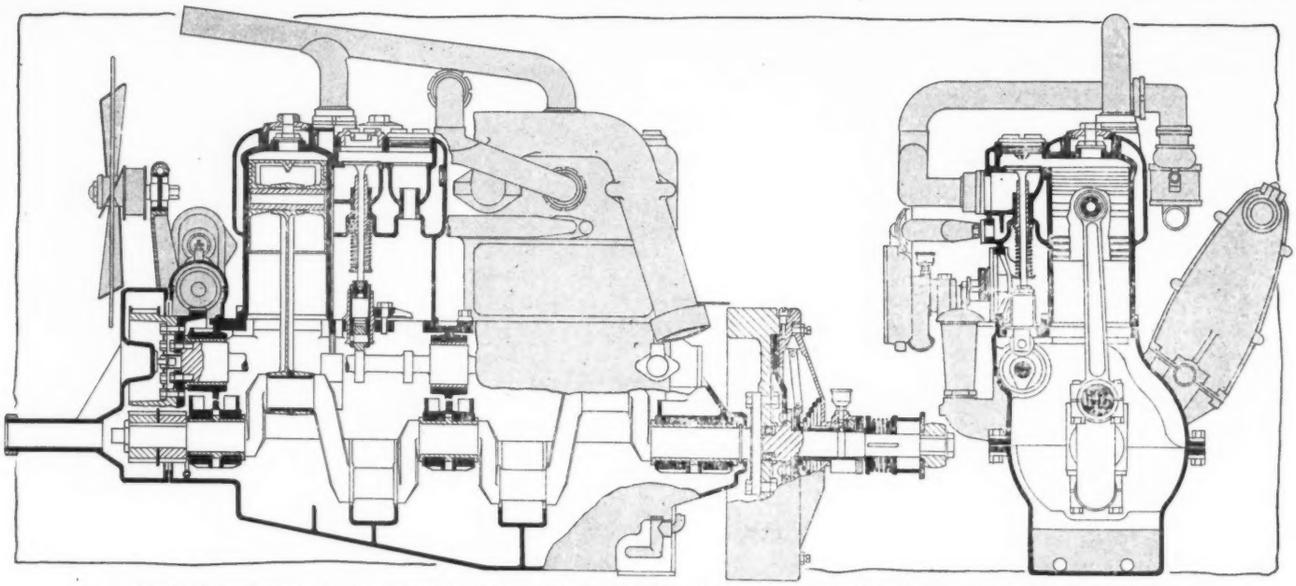
Among the constructional changes on the two four-cylinder chassis the chief one on the 4-35 is the extension of the Gray & Davis cranking and lighting equipment to be included as stock equipment on all three models instead of only on the larger four, as obtained during the early part of the closing season. This has necessitated some changes in the arrangement of the motor appurtenances to properly locate the electrical apparatus.

Also in the smaller four the fuel system has been altered slightly by the addition of a small .5-gallon auxiliary gasoline tank under the hood. Gasoline from the main supply tank under the seat feeds to this small tank and thence to the carbureter to give a more certain fuel supply on hills. This arrangement has been necessitated by the lower position of the main tank due to the greater depth of upholstery.

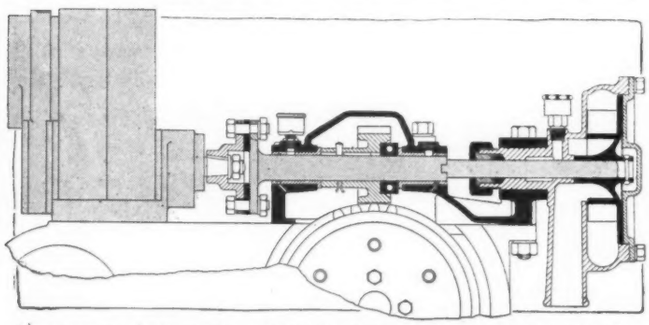
Changes on the larger four, the 4-45, include the removal of the fuel tank from its former position under the front seat to



Plan view of the chassis of the Velie 4-45 for 1914. Bodies for this chassis are interchangeable with the six



At the left—Sectional view through the Velie 4-45 motor for 1914. At the right—End section of the same motor



Transverse shaft used on the Velie 4-45 for 1914 which drives the water pump and magneto

the rear and the installation in the gasoline line of a special fuel strainer under the hood, which may be quickly cleaned. This is rather novel as stock equipment but will be appreciated by most owners. The water pump is located in the new motor on the end of the transverse shaft which also drives the magneto, whereas formerly it was at the side and driven by a longitudinal shaft. The new location on the valve side permits cold water to be forced into the motor first around the valve.

In the 1913 engine the Gray & Davis cranking motor drove through the flywheel, but in the new engine the starter drive is through spur gears to a longitudinal shaft that runs to the front and thence by silent chain to the crankshaft. The drive includes a silent over-running clutch.

The Big Four Model

The 4-45 car is the one typical of Velie design and incorporates most of the Velie features. The motor, an L-head design with the cylinders in pairs, incorporates two somewhat unusual points of construction, one is the chain timing drive and the other the worm-driven cross shaft at the forward end. Another unusual construction is the arrangement of the carbureter and intake manifold, the former mounted upon the right side of the motor while the valves are upon the left. The carbureter is placed very high so that the float chamber is about level with the top of the cylinders. The intake pipe passes over the cylinders to the intake valves on the other side of the engine. This makes the carbureter very accessible. The hot-air intake pipe from the exhaust manifold to the carbureter passes around the rear end of the motor.

Another instance of great accessibility is the location of the magneto and water pump, on the end of the transverse shaft. The worm drive to this shaft is oiled by a lead from the lubrication system, which latter is of the circulating splash type with individual oil leads to each connecting-rod pocket.

A special feature is the method of attaching the intake manifold and water header connections, this consisting of a special screwed coupling instead of the usual bolts and studs and comprises a split wedge ring which seats against the flared end of the manifold and is held in place by a threaded gasket which screws down to the cylinder casting. This arrangement makes a gas-tight joint which is self seating, and the connections are interchangeable throughout the motor.

Silent Chain Generator Drive

The generator portion of the two-unit electric system is mounted upon the forward end of the cranking motor and above the motor and drives by a silent chain from the longitudinal shaft running from cranking motor to engine crankshaft. This chain is housed and runs in oil splashed up from the crankcase, to which it is open. The generator is driven at a speed reduction of 2½ to 1. The battery is an LBA 80 by 120-ampere-hour one carried under the front seat. The Bosch magneto has in its driving shaft an adjustable coupling to alter the timing without disturbing the gearing.

A dry-plate clutch located in the flywheel transmits power through a short shaft to the four-speed gearset close behind the motor. This has direct drive on third speed with a gear ratio of 3 13-14 to 1 on direct and 3 to 1 on fourth. Shafts are carried on ball bearings. Motor and gearset are mounted on a subframe, of channel section filled with ash. A propeller shaft carrying Spicer double universals transmits the power from gearset to the Timken floating axle, which axle has the new adjustable cam plate for the internal brake, thus giving two adjustments, one at the differential on the cross rod and one inside of the drum. Service brakes are external and emergency are internal. Rear springs are three-quarter elliptic and the cars are propelled through them. The axle torque is taken by a large trussed torque arm with ball connections carried in spring cups at the front end giving a universal action. Steering gear is the worm-and-sector type with 18-inch steering wheel and in the center is the horn button. The horn in this model is mounted upon the electric generator drive-chain housing.

Model 6-50 is almost identically the same design except the motor. From the engine back the larger four and six are identical. The Continental engine with its cylinders cast in threes has been described in these columns before. The arrangement of the Gray & Davis electric system is similar to that of the four-cylinder car.

Model 4-35 differs from the larger four in the block casting of its cylinders, in the arrangement of its timing drive, which, however, is a silent chain as in the 4-40. Cooling is by thermo-syphon in the little four, the fuel tank is under the front seat and is gravity feed instead of pressure feed. The cranking motor drive is through a ring gear on the flywheel. Lubrication is by combined force feed and splash system. The cam and magneto shaft drive is through a triangular silent chain with adjustable centers. With the triangular drive, the centers necessarily are far apart and ordinarily at high speeds the chains assume a whipping motion. This tendency is eliminated in the 35 motor by employment of special chain shoes which insure a noiseless drive.

An arrangement for the automatic alignment of the magneto with its chain drive is provided. When slack in the chain is to be taken up this is done by moving the magneto chain sprocket. To prevent having to re-align the magneto the sprocket is mounted upon an eccentric bushing and the adjustment of the chain is effected by moving this bushing without disturbing the magneto itself. This is a new feature for which patent has been applied by the Velie company.

A unique suspension of the motor is provided. This is a three-point system, the forward end of the motor being hung at its middle point on a pressed steel cross member. At the rear it is suspended from the frame side members on a tube which passes through extensions on the crankcase, the tube being trunnioned to the frame. The rear end is hinged for up and down motion with sidewise motion at the front.

Straight-Line Bodies

Bodies of the new Velie cars exemplify the present trend for straightline type and clean running boards and graceful contours. One of the features is the sloping hood with the long undercut cowl and crown fenders with flat strip at the edge. A Velie feature is the double overlaid hinge of the bonnet which makes it remarkably strong. The weight of a 180-pound man in the middle of the hood does not deflect it noticeably.

Windshields are rain-vision types and their attachment is such that they are anchored directly in the cowl without the use of nuts underneath. A tapered hole in the cowl receives the windshield base upon which there is a tapered collar, while a nut anchors the bracket to the socket, drawing the tapered collar into firm attachment between bracket and socket. The windshield baseboard is provided with a felt backing to eliminate any chance of rattle. The instrument board in the cowl is leather faced and all instruments are set flush.

One of the novelties is the roadster. This has a sloping rear deck with doors on each side, which will take two suitcases each, and a door on the deck for other luggage. The forward compartment is exceptionally free from obstruction. This is obtained by the location of the control lever against the forward seat.

The double drop frames with the underslung rear springs give the cars a low-hung, racy appearance. On the five-passenger cars the dash lights are inset and bullet type side lights are fitted to the five-passenger cars and the roadster. The top equipment is characterized by use of the new Atpen chain top holder which has the characteristic of tightening up instead of loosening on rough roads. The holder is a spring ratchet affair which holds the top rigid when it is folded back.

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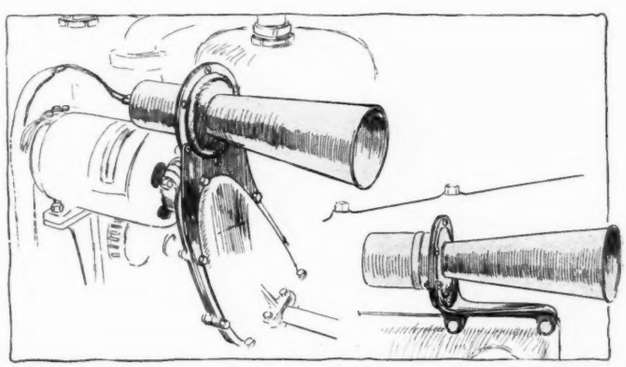
McFarlan Concentrates on Six for 1914

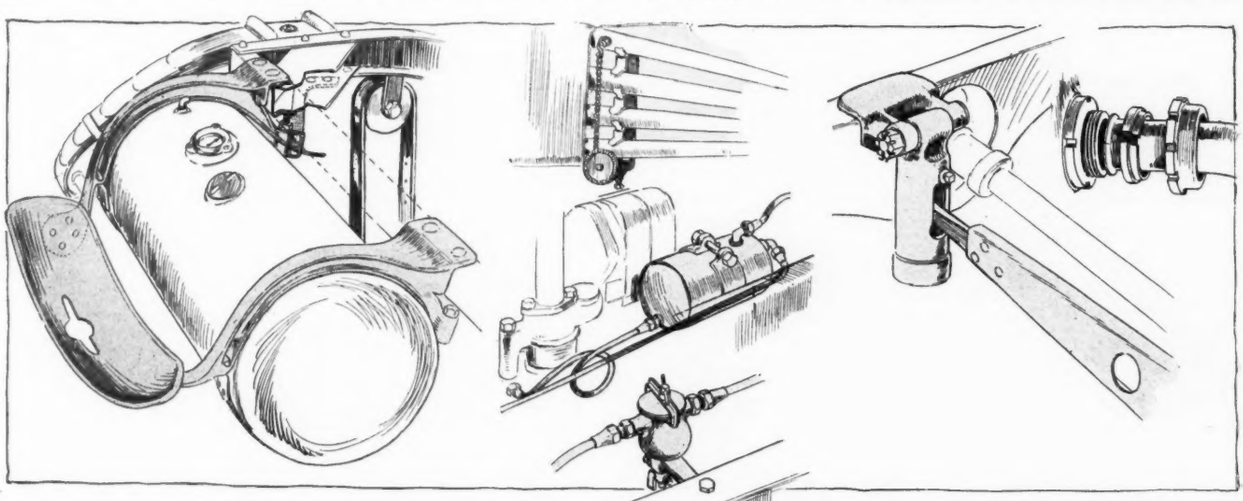
(*Continued from Page 917*)

equipped with Firestone rims having the quick detachable and demountable features. The tire size on this car is the 36 by 4.5. Spare tires are carried at the rear.

The drive is on the left side and a control in the center. Both the clutch and service brake are operated by pedals in the customary manner. The emergency brake lever is in the center of the car next to the gearshift lever. Spark and throttle controls are mounted on top of the steering column and the accelerator pedal is also fitted. The entire control set is mounted on a cross member and is accessible for adjustment. The suspension of this car should be easy as the wheelbase is 128 inches and the front springs are 42 inches long and have eight leaves, 2.5 inches in width. The rear springs are 56 inches long and have eight 2.5 inch leaves. The rear springs are underslung and the rear spring hanger is integral with the brake cross shaft bearing. The steering gear is of the worm and gear type and is irreversible. The steering wheel is 18 inches in diameter.



Two locations for the horn possible on the motor of the 1914 Velie



At the left—Rear of the Velie fuel tank. Center—Top holder emergency fuel tank and gasoline strainer. Right—Manifold coupling and torque rod

The Rostrum

Quicker Action Makes Gearchanging with the Electric Shift Simpler Than with the Lever

EDITOR THE AUTOMOBILE:—I wish to ask a few questions about the electric gearshift. I have never seen a car having it nor any detailed account of its operation, but certain objections to it have occurred to me which may or may not be well founded.

1—It is stated that, when the button is pressed and the clutch thrown out, all gears are brought to a stop. Can this be done when the car is running and will not a second clutch between the gearbox and the rear axle be necessary to do it?

2—While running forward, say 20 miles per hour, what will happen if one presses the reverse button and throws out the clutch? In the common form of gearshift this would result in great damage. Would it with the electric, since they say that can bring all gears to a stop?

3—If, when running down a long, steep hill, one puts the gears in neutral and cuts off the ignition, so that the engine stops, can he then shift into gear without slowing down or stopping the car?

4—If the last two methods will produce a clashing of the gears, as it would with the ordinary method, is there any way to stop the automatic operation? With the ordinary system when one finds the gears will not engage, he goes back into neutral until he gets them at the proper speed, but would not the electric system keep on pushing them together, to the great damage of the teeth?

5—If one is running on the high and has to make a quick stop so that, when stopped, he finds himself with the clutch out and the high gear engaged, how does he then get into low for a new start? Must he let in his clutch, taking a chance of stalling his engine or of burning his clutch leather, while he presses the low button, and then throw it out for the shift, or can the shift be made while the clutch is out by simply pressing the button?

6—Is it necessary to throttle down the engine in going from first to second, and second to third, and to speed up the engine in going from third to second, and second to first, as in the usual form of gearshift? Or are the gears brought to a stop in such a manner that the speed of the engine makes no difference?

7—Probably the most difficult gearshift to make properly is the change from third to second when going up hill. Does this system make it any easier?

I believe that your readers will be interested in a fuller description of the method of operating this new system than has yet appeared.

Los Angeles, Cal. H. R. HIRSHAW.

—1—As far as the clutch action and gearmeshing are concerned there is no difference between the electric and manual methods of shifting except that the former is much quicker, so the statement that when the clutch is thrown out all gears are brought to a stop is untrue. There is no clutch between the gearbox and rear axle as you suggest and so the gears on the mainshaft must revolve as long as the car is moving. The clutchshaft and the gears on the countershaft must also continue to turn until the clutch is brought to rest by its brake if it is so equipped or until bearing friction stops it.

2—If, when running forward at a speed of 20 miles per hour, the reverse button is depressed and the clutch pushed out the reverse gear would engage although no damage would occur unless the clutch were then engaged.

3—Although, with the ordinary type of gearshift, it is difficult and in most cases impossible, to engage high gear under the conditions stated the electric shift is so much quicker in its action that this may be done without difficulty.

4—As already stated, the shifting is accomplished so quickly that no clashing sound can be heard. If for any reason, after pressing a certain button it is desired to change to some other speed or to neutral it is only necessary to press the desired button.

5—After coming to a stop on

Gripping the Wheel

Editor "The Automobile"—Why is it that when a man is taught to run his car almost invariably nothing is said to him about the necessity of gripping the wheel tightly when driving at high speed? It seems to me that the importance of this can hardly be emphasized enough when it is considered that should a blowout occur in a front tire when driving fast and with an insufficient hold on the wheel, the wheel would be wrenched from the driver's hands and the car would probably turn turtle.

When an automobile is traveling at a high speed and a tire blows out the resistance that the flattened tire offers to the road is greatly increased. Anyone who has driven a car with a deflated front tire knows how hard he has to pull against this extra force to keep the car on a straight course, so it is no wonder that when this force is suddenly applied, the motorist who has a loose hold on the wheel and whose arms and body are not braced for just such a contingency loses control of his car and the result is a serious, and, in many cases, fatal accident.

J. E. B.

Trenton, N. J.

high-gear, low may be engaged by pressing the proper button with the clutch held out.

6—It is not necessary to close the throttle when progressing forward through the gears or to speed up the motor when shifting to a lower ratio but it is always desirable to do so, the idea being to bring the motor speed as near to the speed of the driven member of the clutch as possible before letting the clutch back in so as to avoid the strain that would occur if these two members were brought together when rotating at widely different rates.

7—Shifting from third to second on a hill is accomplished without difficulty by pressing the right button and then pushing out the clutch. In making this change it is best to hold the throttle pedal down letting the clutch engage slowly enough to allow the motor to get up to the speed required of it.

Who First Made Two-Speed Axle?

Editor THE AUTOMOBILE:—In the July issue you had an article on two-speed axles, such as the Cadillac and Austin cars are to be equipped with in the coming season. Please tell me who used these axles 6 years ago?

2—Who used them a year ago?

3—Who was the first to put a self-starter on an automobile as standard equipment?

4—Who was the first manufacturer to use the electric starter and when was it adopted by them?

5—What cars have adopted the worm drive and how long since?

6—Who makes cyclecars?

7—Could you give me specifications of one maker?

Easton, Pa. J. B. HURDE.

—1—In 1907 the Alco company equipped one of its models with a two-speed bevel gear drive. This gear gave a direct reduction on both third and fourth speeds. It was not a two-speed axle, however, as this car was equipped with chain drive and the double bevel gear reduction was in the differential on the jackshaft.

2—The Austin company was the only one using the two-speed axle last year.

3—The first concern to use a self-starter as standard equipment was the Fiat company. In 1907 they equipped a six-cylinder 50-horsepower model with a compressed air starter, air being furnished by a small compressor located at the front of the engine and driven by an eccentric on the crankshaft. Air was carried from the storage tank to the cylinders by a pipe similar to the intake manifold, and was admitted to the cylinders through a special set of valves which were operated by the inlet valve camshaft.

4—The Cadillac company was the first concern to adopt the electric self-starter which it did in 1912.

5—The Edwards-Knight, Keeton and Holley companies, all three of which marketed their first cars this year, are the only American concerns using worm drive on passenger cars.

6—Following is a list of American cyclecar companies:

American Cyclecar Co., Detroit, Mich.
Automobile Cyclecar Co., Detroit, Mich.
American Voiturette Co., Detroit, Mich.
Blood Bros., Kalamazoo, Mich.
Continental Engine & Mfg. Co., 411 Arthur St., Minneapolis, Minn.
Cricket Cyclecar Co., 88 Congress St., Detroit, Mich.
Dabis Cyclecar Co., Detroit, Mich.
DeCross Cyclecar Co., 510 Free Press Bldg., Detroit, Mich.
Detroit Cyclecar Co., 510 Free Press Bldg., Detroit, Mich.
Downing Cyclecar Co., Detroit, Mich.
Duryea Motor Co., Saginaw, Mich.
Economy Car Co., Indianapolis, Ind.
Falcon Cyclecar Co., Cleveland, O.
Fenton Cyclecar Co., Fenton, Mich.
Flaglor Cyclecar Co., 2829 N. Halsted St., Chicago, Ill.
W. S. Frazier & Co., Aurora, Ill.
Gadabout Motor Corp., Suite 707, 29 Broadway, New York City.
Hinchman-Baker Co., 503 Free Press Bldg., Detroit, Mich.
Imp Cyclecar Co., Auburn, Indiana.
H. Jordan Mackenzie, 1001 Hennen Bldg., New Orleans, La.
Joliet Auto Truck Co., Joliet, Ill.
J. P. L. Cyclecar Co., Detroit, Mich.
Los Angeles Cyclecar Co., Los Angeles, Cal.
Motokart Co., Tarrytown, N. Y.
Princess Cyclecar Co., 1311 Dime Bank Bldg., Detroit, Mich.
Leigh M. Railsback, Saginaw, W. S., Mich.
Ritz Cyclecar Co., Brooklyn, N. Y.
Saxon Motor Car Co., Detroit, Mich.
Twombly Motors Co., 258 West 69th St., New York City.
Victor Motor Car Co., 271 Diamond St., Philadelphia, Pa.
Ward Cyclecar Co., 1916 St. Paul Ave., Milwaukee, Wis.
Woods Mobilette Co., 1509 Michigan Ave., Chicago, Ill.
Zip Cyclecar Co., Davenport, Iowa.

7—Specifications of two cyclecars made by the Los Angeles Cyclecar Co., Los Angeles, Cal., were given last week. One is a four-cylinder model rated at 15 horsepower, and the other a two-cylinder machine with a 10-horsepower motor. The bore and stroke of the larger motor is 2.5 by 2.5 inches, and the cylinders are of the T-head type, block-cast. A two-bearing crankshaft is employed. A friction transmission is used and final drive is accomplished by chains. The frame is constructed of angle steel, reinforced by hardwood sills and is underslung. Wire wheels with 28 by 2.5-inch tires are used. Wheelbase is 102 inches, tread 44 inches and weight 500 pounds.

The smaller model has a two-cylinder, air-cooled motor with a bore and stroke of 3.375 by 3.875 inches. Friction drive is also used on this car but final drive is through 1 by 1.5-inch V-belts instead of chains. Neither model is equipped with a differential.

Small Peugeot Racer

Editor THE AUTOMOBILE:—Could you publish some details concerning, and an illustration of, the motor used in the Peugeot racer that won the small car race on the Boulogne circuit recently?

Yonkers, N. Y. A. J. K.

—The Peugeot motor you refer to is illustrated in Fig. 1. Although it has a piston displacement of only 3 liters, or 183 cubic inches, the car averaged 63.2 miles per hour for the 387 miles. The cylinders are cast in block with valves in the head. There are two inlet and two exhaust valves in each cylinder. The camshafts, one for each set of valves, are located on the top of the cylinder casting, operating the valves directly. Also noteworthy of mention, are the individual exhaust pipes gradually bending to the rear and the large breathers extending up from the crankcase.

Why Ford Limits Guarantee

Editor THE AUTOMOBILE:—It would be very interesting to me and no doubt to many other Ford owners to know why the Ford Motor Co. limits its guarantee "To cars left as originally built

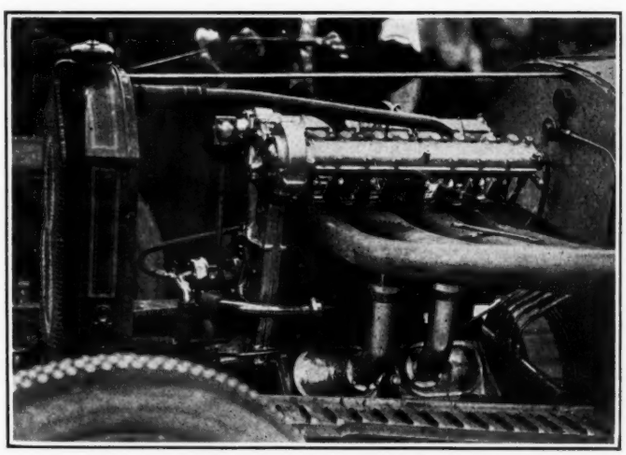


Fig. 1—Showing valve in head motor and overhead camshafts on Peugeot racer that recently won the Boulogne circuit for cars of 3 liters piston displacement

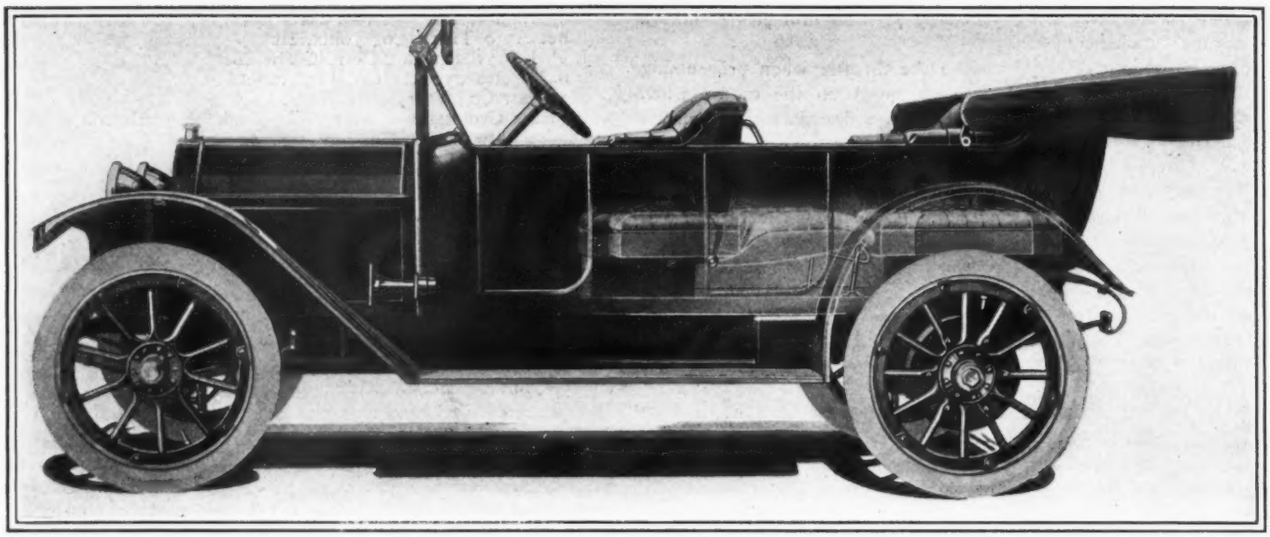


Fig. 2—Spaulding touring car equipped with folding back to front seat, enabling the seating space to be converted into berths for two people. The equipment includes an electric reading lamp and pneumatic mattress

by us," and thus frown upon any attempt to improve the car. It seems like a joke to a layman that devices which are supplied as regular equipment on higher priced cars should be a detriment to the Ford, and what do you suppose would be the technical objection to the installation of a high-tension magneto of the same manufacture as used upon high class cars?

I have had no trouble in keeping my four cylinders working since I installed a master vibrator and the muffler cutout is quite an improvement. I would like to know if the electric headlights when run off the magneto, are injurious to it? They are mighty convenient. I have finally succeeded in getting most of the rattles out, and if I could only get the noise out of the valves, I would have a very satisfactory little car. Can you suggest anything?

It is my personal opinion that had the price of 2 years ago been maintained and this money been put into the car itself as most manufacturers have done, it would have been much more satisfactory to the user.

Buffalo, N. Y. CONSTANT READER.

—The Ford company limits its guarantee to "cars left as originally built by us" because some repairman or owner might make a change in the car that would result in a breakage that would be in no way due to faulty design or poor material in the car as originally sent out by the Ford company. This clause in the guarantee is not peculiar to the Ford company but will be found in not only all the warranties given by the various automobile manufacturers, but also in the guarantees given by all sorts of manufacturers.

The Ford company does not advise operating electric headlights from the current generated by the magneto.

You can deaden the click caused by the valve tappets striking against the valve stems by slipping fiber tips, made for this purpose, over the ends of the stems. These are obtainable at any large supply house.

Effect of Cold Weather on Fuel

Editor THE AUTOMOBILE:—Motorists living in the northern and central states are looking forward with some anxiety to the advent of cold weather and its effect on the manner in which the present grades of gasoline will vaporize when the crank is applied to a cold motor. Some up-to-date information on cold-weather starting has been developed during the past summer by experiments made in cold storage under the auspices of the Studebaker engineers. These experiments were based on the ordinary commercial grade of gasoline, and while some allowance must necessarily be made for the dead air incident to refrigeration, the tests will, it is believed, come close to the actual condition which will prevail this winter.

It was ascertained that the lowest temperature at which gasoline would vaporize from a piece of waste soaked in the fluid and dropped on the floor, was 5 degrees above zero. At this temperature, the Studebaker six used in the tests started handily on the first turn of the electric cranking system. Below this temperature, however, the gasoline in the carbureter refused to vaporize. Naturally, no explosion could be secured from the motor.

At a temperature around zero, several tests were made, the gasoline readily responding to any external application of warmth. The most effective, as well as the most simple plan was to place a rag, soaked in hot water, over the intake. The car had been left over night in the cold storage department, with the temperature at 12 degrees below zero. In the morning the rag was applied and the motor started promptly on the first turn of the electric cranking apparatus.

This test also calls attention to the fact that, by improved carburetion supplemented by the electric starting system, engineers have fully kept pace with the steadily lowering grades of gasoline, generally on sale. The motorist of former times, even with his advantage of high-test gasoline, found winter starting more or less trouble. On the other hand, the modern improvements have reduced cold weather starting to absolute simplicity, despite the vastly lower vaporizing point of the fuel.

Detroit, Mich. P. H. BRUSKE.

Electricity vs. Acetylene for Lighting

Editor THE AUTOMOBILE:—R. M. Newbold, in his article in THE AUTOMOBILE for October 9, states that he would like to ask me "if there is any difference between railroad car lighting and automobile lighting."

There most certainly is.

While it is true that railroad car systems operate on the same general principle as automobile electric lighting systems, that is, they employ a dynamo with accumulator, the similarity stops right there.

The automobile system necessarily operates at low voltage because of the size of battery permissible on an automobile. The railroad car battery is not only large, substantial and much more efficient, but also operates at much higher voltage. The railroad car battery is many times larger in proportion to the load placed upon it than the automobile battery, and in addition, is favored by the higher voltage employed, which means considerably less chemical action in the battery and less deterioration.

An even greater difference in the two systems may be found in the care which each receives. The railroad system, which really demands less care, receives, if anything, a surplus of attention. The automobile system, operating at low voltage, and with great chemical activity in the battery, should have the most careful attention.

Indianapolis, Ind. R. H. Coombs.

Wants Sleeping Car Body

Editor The Automobile:—Do you know of any car that has its seats so arranged that they may be converted into a bed? I have in mind a construction similar to that used on Pullman sleeping cars.

Brooklyn, N. Y. R. F. C.

—The 1914 Spaulding car has a convertible bed of the type you suggest. The back of the front seat is hinged at the bottom and secured firmly at the top by two knurled-head bolts. By loosening these, the back swings down and exactly fills the space between the front seat and rear cushion, making a berth 6.5 feet in length. This equipment may be supplemented by a reading lamp and an air mattress which is inflated by the power tire pump. The arrangement is shown in Fig. 2.

The Ideal Touring Car Body

Editor The Automobile:—I was much interested in the criticism of American automobile bodies by J. F. Brasor published in The Automobile for September 25. If he will refer to *Motor Age* for February 6 and The Automobile for May 1 he will find articles which I wrote on the same subject. It is very gratifying to discover that people are beginning to appreciate beauty in body design. This appreciation, however, seems not to have reached American body designers as yet. With a few notable exceptions the touring cars offered for the season of 1914 do not make the slightest pretense to streamline form. There is still an absolute lack of unity between hood and body.

It is admitted that to gracefully taper the bonnet so that the junction between it and the dash will be almost imperceptible is not the easiest of tasks. A great deal of course depends upon the shape of the radiator.

A feature which the American motor car manufacturer has not as yet even thought of supplying is adjustable front seats. Apparently all the drivers of any one make of car are expected to be of precisely the same height. How often we have seen tall drivers with their knees jammed against the steering wheels of their cars. If the front seats had a fore-and-aft motion of only a few inches a tremendous increase would be made in comfort. When we consider that the vast majority of the purchasers of medium-priced cars are their own drivers, is it too much to expect the manufacturers to give some attention to their well being? As a matter of fact in cars sold by the thousand the front seats, angle of steering column and pedals should all be quickly adjustable. If the driving seat is not at the correct distance from the pedals and steering wheel it takes more than fourteen inch turkish upholstery to make the occupant comfortable.

There is one thing certain, however, until the public insist upon having beautiful and comfortable bodies they will not get them. It was public demand entirely that brought about the widespread adoption of self-starting and electric lighting. To return to the letter of Mr. Brasor. At the last Importers' Salon in New York City was shown a Metallurgique touring car with a collapsible seat next to the driver and only two doors. Mr. Brasor's idea has thus been anticipated. Within the last two years many foreign bodies have been built on this design but its obvious disadvantages have prevented its general adoption.

Of course the picture published with Mr. Brasor's letter is only a sketch, but I respectfully suggest that the car would ride better if the springs were flatter. The rear construction is reminiscent of the Stoddard-Dayton. The ventilators are facing the wrong way to admit air unless the car habitually runs backward. There is just enough space between the windshield and top to allow the rain to drift in.

The accompanying sketch, Fig. 3, illustrates the views of the writer on body design for open cars. Points to be noted are: The curved section of the radiator top, the absolute continuity of the hood, cowl and body, and also of the underpan, which extends in a continuous sweep from front to rear, thus removing the chief cause of dust raising. The spare wire wheel is contained within the bulbous back thus being perfectly protected and not marring the appearance of the car. A similar disposition of the spare wheel was made in my closed body design which appeared in The Automobile, May 1.

The one-man top when folded disappears completely in the recess at the rear as in the famous Turcat-Méry Dogfish body. The side-lamps are placed on the front mudguards, thus indicating the extreme width of the car. The mudguards are domed and fitted close to the wheels.

The body has high sides—27 inches. Allowing for a 1.5-inch sill the seats are 13.5 inches from the floor. There is plenty of leg room—29 inches for both front and rear seats. All doors are 27 inches wide. Left hand drive and center control which I advocated in *Motor Age* for June 9, 1910, is of course used. The rear springs are of the Lanchester cantilever type 60 inches long. Tires are 36 by 5 inches all around. The wheelbase is 140 inches, which is not excessive for a six-cylinder car.

Paris, France. John Jay Ide.

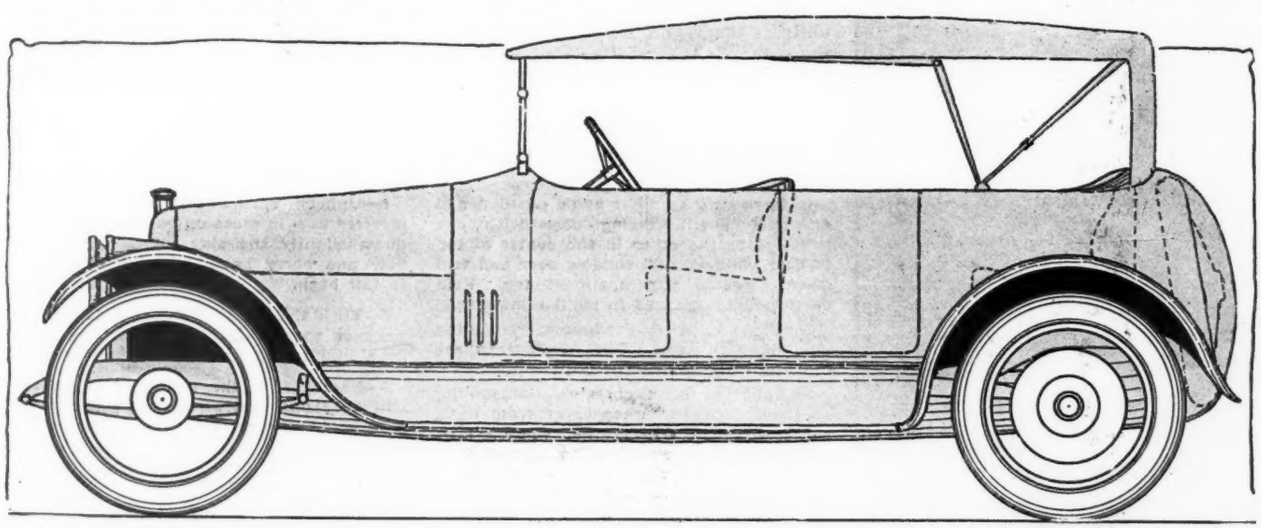


Fig. 3—Notice the high flush-sided body of full streamline type. The top folds into a recess in the back of the rear seat and the spare wheel is carried in a compartment at the back of the car

The Motor Coach

Springfield Convertible Body Uses Only Two Top Bows

New Simplified Type May Be Raised and Lowered Like Ordinary Top—New Method of Securing Windows

THE convertible body represents one of the most interesting possibilities of motor coach work today, in that it provides the car owner with an open touring car body with top folded neatly out of the way for fine weather; an ordinary canopy top for fairly inclement weather; and a completely inclosed car, with top, glass side panels and glass door panels for winter use. In a word, it is the three-in-one automobile body type.

The Springfield Metal Body Co.'s all-year convertible body with folding top and full glass inclosure makes an interesting subject, as do the methods of its manufacture, whereby the details are well worked out. The three illustrations at the bottom of the following page show the three forms in which it can be used and the series of eight cinematographic reproductions on the left of this page show the various operations of converting this body from a completely inclosed type to an open touring type with top folded back, as developed by this Springfield, Mass., company.

The advantage of a body of this kind is the convertible idea, it has all the advantages of the touring body, and at the same time can be converted in a few minutes into a closed body, that is as comfortable as any one could wish. It is rattle-proof, dust-proof and storm-proof, it gives comfort and protection while touring, and, if desired, can be made into a two-compartment body, by the addition of glass or curtains at the rear of the front seat. The sides have large openings without posts or framing to obstruct the vision, other than the framing around the glass, and the occupants of the rear seat have a clear view at all times. The doors are roomy and the entrance is not hindered by slanting bows, nor is it necessary to pass under dripping curtains

Cinematograph Instructions

1—Open door to right angle position and unfasten flaps. Holding door with one hand, place the other in the center of top of door window, pull window over and fold down. Fasten flap again at top. Fold other window glasses in similar manner.

2—Remove the four windows remaining by pulling forward. Put windows in receptacle in back of front seat.

3—Unbutton back curtains, unfastening all knobs. Unbutton top cover from horizontal braces. With socket wrench provided, loosen screws holding central bow to top of door posts.

4—Unscrew wing nut fastener holding front of top to windshield posts. Pushing short intermediate bow upward swing front upward and back parallel with front bow.

5—Unhook spring holding short intermediate bow in place on each side and pull down slightly the side joints. Lift front bow and carry back, allowing entire top to fall back.

6—Tuck the top material in between the bows so that it will fold down compactly; hook and screw down with top fasteners.

7—Fastened to the inside of slip cover will be found two straps with eyelets in each end. Button these to knobs which will be found projecting from top of front and rear bows, thus drawing the top together.

8—Tuck back the quarter curtains under cover before fastening bottom. Bring pads over projecting bolt heads before fastening the cover down.

when it rains as these are replaced by watertight glass windows.

At the will of the owner, the body can be used either as a touring body with the top down, or with the top up and all or part of the glass frames in position, taking less than 3 minutes to take out or put in the glass frames, and two persons can lower the top without previous experience, other than knowing the method in which to proceed.

The first impression one gets on going through the factory is that a marvelous amount of work has been expended on this body type to bring it up to the present state. It is not possible at this time to describe the various steps of progression in its development, but, comparing the first model with the latest one, it is easy to see that this has been along practical lines, and that the present body represents true progress step by step, meeting the actual service conditions, until we see the trial-tested product refined to a mechanical nicety.

To build a convertible body, it must be from the ground up; many have an idea that the upper structure can be assembled to the ordinary touring car body, but this cannot be entertained for a minute. The upper structure cannot be put on any body not made to receive it.

The Springfield company is the pioneer to specialize on convertible body types, and, by standardizing the parts, it is able to carry them in stock, and therefore is able to build, quickly, bodies to suit the different types of chassis. The company has evolved and established a body design that best suits the convertible idea, and the changes in design that are effected by the varying chassis models are those connected with the length and shape of the chassis frame and the wheelbase and tread.

All its bodies are made from sheet aluminum, with ash framing and steel forgings for body braces.

The body top line is horizontal from the windshield post to the back upright, and this top line is finished with a metal plate having a half round rib extending lengthwise on the plate, and over this the rubber channel of the glass frames are guided and held in position.

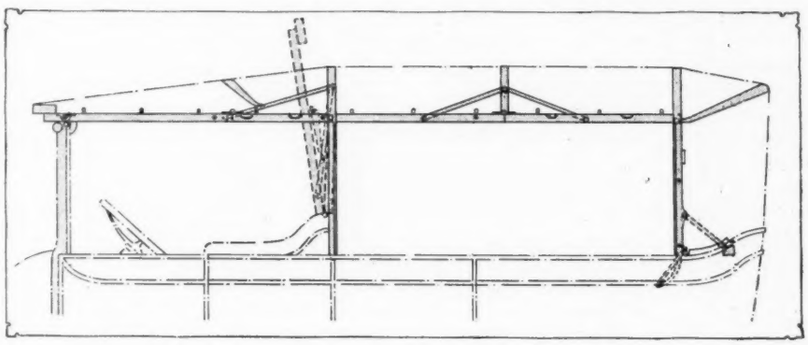
Top Structure Simple

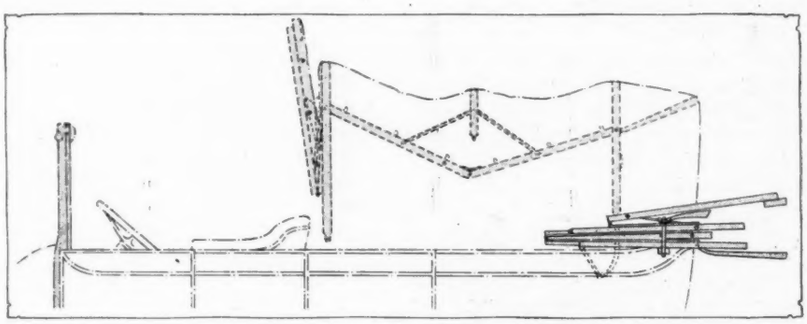
The top or upper structure is made of metal with wood to form the bows. This is fastened to the metal and the cloth goods in turn is fastened to the wood. The illustrations at the right of page 929 illustrate the roof structure and show the progressive movement of the falling of the top. Illustrated in this way without the top covering, it is possible to get a clearer idea of the mechanical features, for it must be emphatically stated that the makeup of the top is the central figure that makes a convertible body practical.

The front windshield post, shown in the same illustrations, is fastened solidly to the cowl of the body, and it is the bulwark of the upper structure. It is a cored casting, and the tubular construction makes it very strong as well as very light. To this the windshield is fastened, the top of the post forming one part of the revolving hinge. The top is also fastened to this post by a wing nut fastener, and the post forms the rabbet that is the windbreak for the front of the door glass frame.

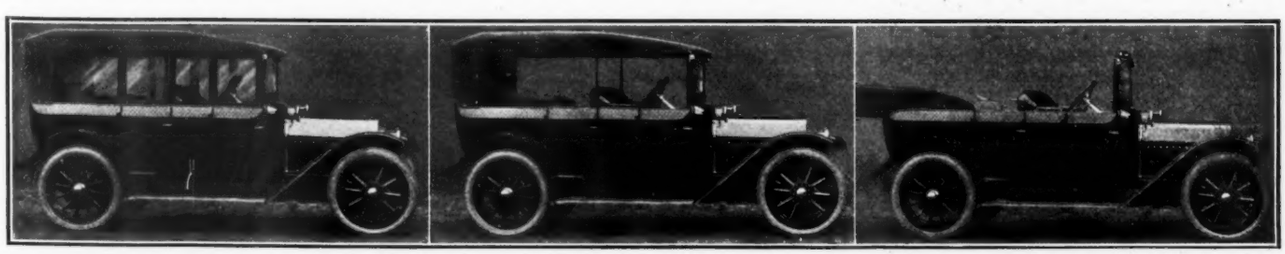
Light as Touring Car Top

The top structure is very light, weighing no more than the ordinary touring top, and the folding down and raising operations bear the same comparative equivalent, with the exception that the Springfield top, being controlled at each stage by the mechanical structure, will fold easier and closer. The movement of the rear post is one of the patented features. This automatically moves forward at the bottom as the top is lowered, and shortens the overhang of the top in its down position, the rest or support being formed by the V-shaped block on the back of the post, engaging with a block made to receive it on the body. This is a metal-to-metal stop, and the top is locked with a hook slipped through a plate on the front member of the top. The hook engages on the underside of the rest block and the thumb nut at the top is the adjustment, this is a non-slip device that prevents its backing off and loosening. The plate that holds the nut is arranged to turn back on a hinge, and thus lie concealed on the inside of the top member when not in use. The block on which the top rests is extremely close into the side of the body

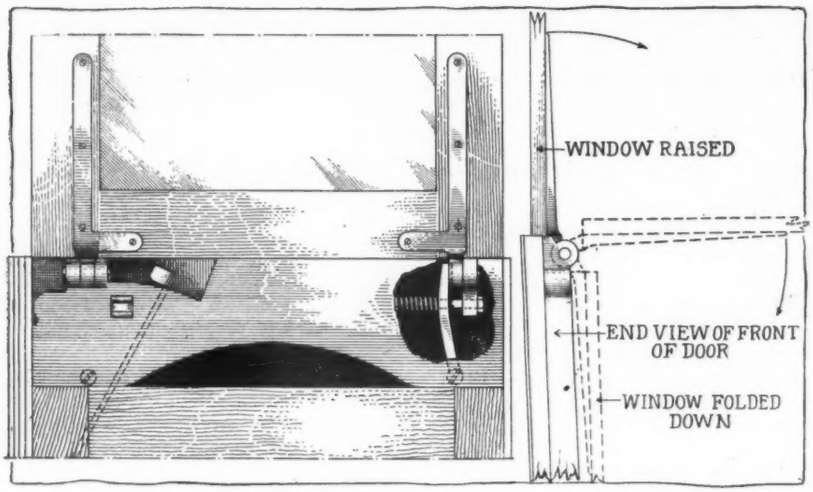




The two above illustrations show the roof structure and the progressive movement of the falling of the top. The front windshield post is fastened solidly to the cowl of the body. To this the windshield is fastened, the top of the post forming one part of the revolving hinge. The top is also fastened to this post by a wing nut fastener and the post forms the wind break for the front of the door glass frame



The above illustrations show the Springfield convertible body, first, as a completely inclosed type, then, with the top up but the sides open, and, lastly, as an open touring car with the top folded back



Section of the rear right side door without the trimming. At the right of the drawing a portion of the casting has been broken away to show the spring action on the lever arm that locks the hinge. At the right is an end view of the same door, showing the glass frame both folded and open

and is inconspicuous. In addition to the hookbolt, the top is further fastened with straps as shown in the illustrations. The top is thus made rattle-proof in both its up and down positions.

There are four windows on each side or eight to a body, and four of these are permanently fastened to the doors by hinges. These hinges allow the frames to be revolved from the open to the closed position, and a spring tension constantly bears on the lever arm that locks the hinge in the two positions by engaging in a notch provided in the side of the hinge. The illustration at the top of page 930 shows a section of the rear right side door, without the trimming. A portion of the glass frame is also shown in position. At the right side of the drawing a portion of the casting has been broken away to show the spring action on the lever arm that locks the hinge. The same illustration is the end view of the same door, showing the glass frame in both the up and down position. The door glass frames are made rattle-proof by the spring action on the hinge at the bottom, and at the top the frame forms a contact with the horizontal member of the roof, and there is enough tension when the door is closed to obviate noise. Channel rubber is used top and bottom of the frames and on the sides the wind and rain is kept out by the molding and by the frames overlapping the post rabbets. These door frames are as wide as the doors, and this is the only body made having doors and glass frames of equal width that can be opened and closed without disconnecting.

Window Details Well Worked Out

The quarter frames are assembled into their places by resting the lower edge on the top line of the body, and inserting the back top edge under the first of the two lip guides that hold them in place and then slide back until the frames form contact with the upright. These frames are made with rubber channels on three sides, the top, bottom and rear, the lip guides at the top having springs that press on brass plates set in the channel, which serve to keep the frame down firmly while the channel at the bottom straddles the metal rib on the plate. This acts as a wind and water-check, and the doors, when closed, act as a force in keeping the quarter frames back in position. The front quarter frames at the rear enter a channel in the central bow, but the rear quarter frames depend on the goods that form the cover to extend over the joint of the glass and frame post.

The illustrations at the bottom of page 931 show details that typify the thoroughness of the construction work. Small as these items may seem, they indicate not only that time and labor have been spent on the main essentials of the job, but that the raw ends that are always coming to the surface in manufacturing have received their share of attention. Every mechanic knows that these little details require greater patience and an equal amount of energy to surmount than do those operations that are a straight mechanical proposition.

The illustration at the left, bottom of page 931, shows the goods in section that form the side quarter curtain at the place where it joins the back post. This curtain in the earlier models opened up between the fasteners and allowed the wind and water to blow through, and the flap, as illustrated, was added to overcome this trouble. The flap is sewed to the curtain and rests against the post and the glass frame, pressing against it, forms a tight and effective protection. This flap has a flexible steel strip stitched to it, so that it holds the curtain straight as well as close in. The same illustration depicts a similar arrangement to provide for the top goods where it laps over the frame at the top. This is reinforced with leather in place of steel and is buttoned over knobs on the upper side of the top member. The fastenings are on the outside as usual.

This attention to detail is seen throughout the body construction and shows that no pains have been spared to make a closed body that is just as substantial as a limousine, one that is proof against cold winter weather, yet has the advantage of being convertible.

Claims Advantages for Double-Texture Top Material

BOSTON, MASS.—Editor THE AUTOMOBILE:—Outside of electric Stanhopes, leather is not used for making automobile tops, but there are several kinds of artificial leather on the market for this purpose.

We are producing for the coming year three distinct lines of top materials, namely, Neverleek top covering; mohairs, and waterproof ducks.

Neverleek top covering is a double-texture, surface coated fabric, that is, two cloths cemented together and on one side coated with rubber which is embossed and finished to have the appearance of leather. One of the cloths is, of course, covered by the surface coating and the other cloth acts as a lining. This lining can be varied in pattern and quality to meet the ideas of the various purchasers. The outside coating acts as a protector, protecting the inside so that it remains permanently waterproof.

One advantage of this double-texture top material is that it does not obtain its flexibility by the means usually resorted to in the case of many so-called artificial leathers. These invariably contain a greater or lesser proportion of oils to soften them. As all oils are volatile, when these artificial leathers are exposed to the atmosphere volatilization sets in and eventually the artificial leather becomes brittle and cracks and flakes.

Mohairs have only one point which might be considered an advantage over top fabrics, namely, their handsome appearance when new.

We are also marketing this season a line of waterproof ducks. These ducks are made in a variety of patterns, both plain colors and fancy weaves. In their manufacture the yarns are beaten up very closely together and the whole fabric is chemically treated so as to take away from the cotton yarns their natural absorbent qualities, thus making the fabric water repellent and to all practical standpoints waterproof.

This line of material is particularly adapted to very hot, dry climates, where there is a large amount of sunshine and a small amount of rainfall, such as Southern California and Texas. The particular merit of the waterproof duck is the fact that it has no coating to dry out, regardless of the severity of the climate in which it might be used.—W. B. ROOD, F. S. Carr Co.

Favors One-Piece Material for Tops

UNTIL a year or two ago it seemed to be generally accepted that leather was the proper and only material to use for the upholstery of automobiles just as it had been in the practice of coach work for open vehicles previous to the entry of the self propelled vehicle. But the search after comfort, cleanliness, originality and good appearance soon brought about consideration of other materials that could be made to meet the rather exacting requirements of the automobilist. The success of the various cords during the past two years makes this a matter of great interest. In the same way it is being held by many students of top materials that the use of rubber and similar waterproofing means in the construction of material for automobile tops is not entirely satisfactory from the point of view of deterioration by exposure to weather and the mechanical stresses imposed during the raising and lowering of the top. Various cloths waterproofed in other ways are now used. Both these points, that of upholstery material and the manufacture and requirements of tops are dealt with in the following letter from a manufacturer.

Manufacturer Gives His Views

NEW YORK CITY—Editor THE AUTOMOBILE:—For over 5 years the writer has been of the opinion that automobile cloths of double thickness, that is, two thin cloths cemented together with rubber compositions, some with a plain cloth face (mackintosh cloth), others with artificial leather coated faces, were not mechanically right for the purpose intended and were not constructed so as to withstand the abuse and hard usage which automobile top fabrics receive. When subjected to the hard usage demanded of them, most cloths of this construction show blisters, cracks, breaks, tears, rubbed through holes, etc. It is worthy of note that practically no double-texture tops are used in Europe.

"Burbank" English cloths are single-thickness, one-piece fabrics with the wear distributed throughout every shred of the cloth from the face right through to the back. They contain no rubber compositions, artificial leather compositions or compounded ingredients of any kind, but are nevertheless absolutely waterproof and unaffected by climatic conditions such as would cause deterioration in fabrics containing rubber.

On the introduction of these single fabric cloths into this country there were many who considered them incapable of meeting the exacting demands of practical usage on the automobile. But the fact that this type of top cloth was soon adopted by many of the leading top and body builders shows the fallacy of such a supposition. In this connection it is significant that for the past 3 years every open car exhibited at the Importers Salon at the Hotel Astor, which had a top had that top made of English Burbank motor top cloth. Some of the high class American manufacturers have also adopted this cloth as a standard material for top construction and that these concerns only do so after subjecting it to the severest tests seems to me to be a strong indication of its waterproof and wear-resisting qualities.

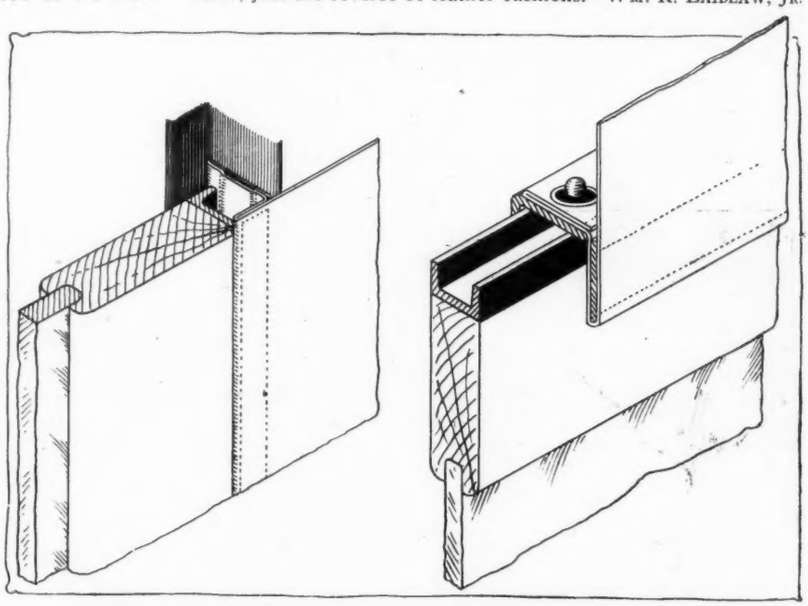
Besides the material for tops Burbank cloth is also supplied in a form suitable for motor seat covering and with the same claims for superiority over double-texture slip cloths. You well know that it is a common sight to see a set of rubber interlined slip covers with the outside or surface cloth badly worn or blackened by the face cloth having been worn off right down to the rubber interlining. You also know that it is impossible to clean rubber interlined slip covers, particularly with gasoline because gasoline is the solvent of rubber and just the instant gasoline is applied to rubber interlined slip covers, the rubber is dissolved and the surface cloth blisters or comes loose. By using one solid piece of cloth the cover can be soaked in gasoline or scrubbed with soap and water without injury. There is no such thing as its rubbing through, because the wear is not confined to the surface, but is distributed throughout.

Worsted Bedfords for Upholstery

Turning now to the allied subject of upholstery for touring cars and open bodies it is well known that until comparatively recently the material invariably used for this purpose was leather. Two years ago on the introduction of worsted Bedford cords as an upholstery material similar objections to those encountered in connection with the single-piece top fabric were forthcoming. It was suggested that worsted cloths would hold the dirt, would fade, would wear through, etc., but nevertheless at the 1912 New York Automobile show there were twenty-seven open cars trimmed with our "Halo" Auto Bedford Cord.

It should be noted that these cords are not woolen Bedfords but are made from worsted, the long fine fibers of which make a hard tightly twisted yarn that does not absorb dust and dirt but repels it. The goods have been made sun and water-proof.

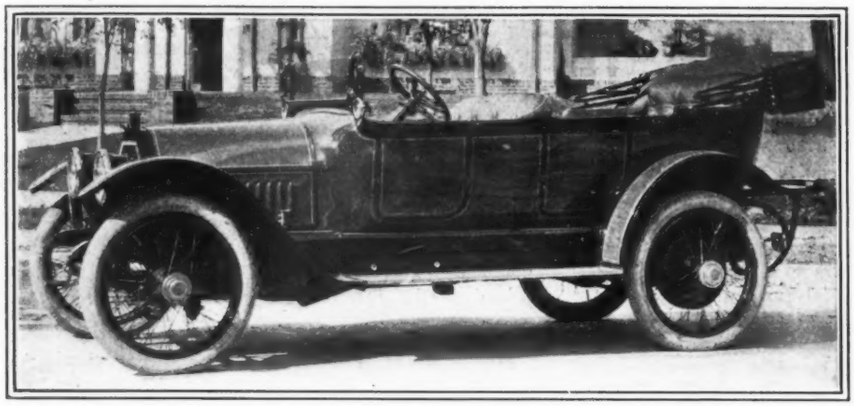
The comfort and easy riding of a cord trimmed car is much greater than a leather trimmed one. In addition to this you do away with the necessity of having slip covers, and when riding on rough roads you do not slide about as you do on a leather seat. In summer the seats are cool and in winter they are warm, just the reverse of leather cushions.—WM. R. LAIDLAW, JR.



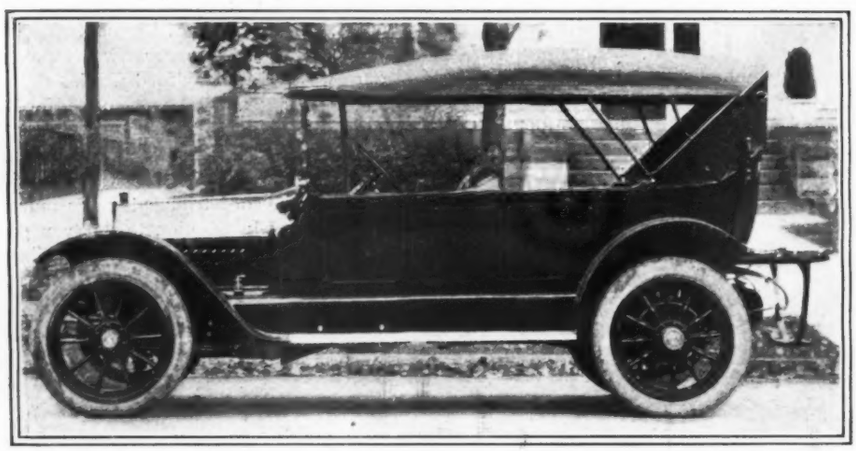
At the left is shown a section through the materials that form the side quarter curtain at the place where it joins the back post. The flap was added recently to overcome leakage of wind and water through the joint. This flap has a flexible steel strip stitched to it to hold the curtain straight as well as tight. At the right a similar arrangement is shown designed for the top material, where it laps over the frame at the top. This is reinforced with leather instead of steel and buttons over knobs on the upper side of the top member

Stearns-Knight Has European Features

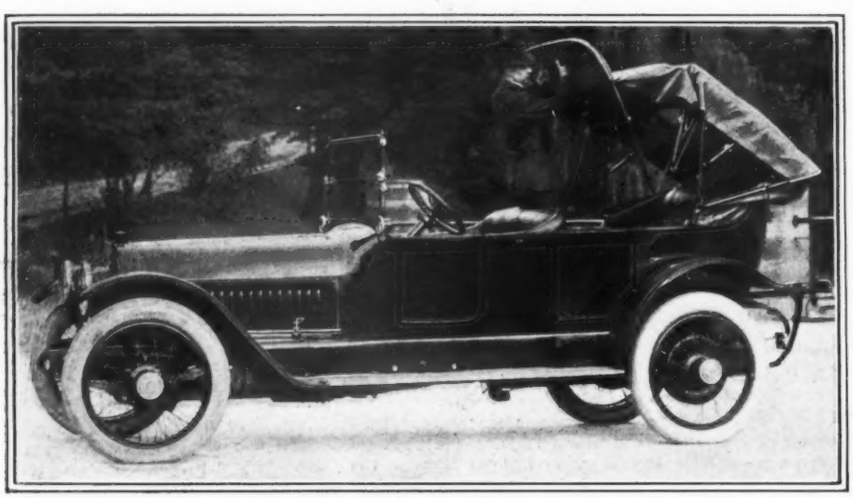
New Four and Six Show Foreign Influence in Body Design — Novel Upholstery



The new four-cylinder, four-passenger Stearns-Knight for 1914, giving an idea of the new design—the clean edges unbroken by projecting upholstery and the low, rakish effect produced by the continuous lines, and the new design of the front seat, which is kept low to harmonize with the general contour of the car



Four-cylinder, six-passenger touring car, showing the one-man top in position. It will be noted that the only side bows used are at the rear, the front of the top being supported by the windshield, which is built integral with the cowl. Note the large tire carrier



Illustrating the method of raising the one-man top, which is a feature of the new four and six-passenger Stearns-Knight touring cars. The car shown in the illustration is a six-cylinder, four-passenger model

TWO of the new models which the F. B. Stearns Co., of Cleveland, O., has added to its line this year—the four and six-passenger touring cars—embody a number of features which are new to this country. The recent visit of one of the Stearns officials to the plants of some of the prominent European manufacturers—particularly that of Van den Plas, body-makers of Belgium—may have something to do with several of the new ideas incorporated in these cars, as the innovations are almost entirely in body design. The chassis—both four and six-cylinder—are the standard Stearns-Knight chassis.

General Effect Is of Clean Lines

The new bodies are striking in their lines—the clean edges, unbroken by projecting upholstery, giving a long, low, rakish effect that immediately wins attention. This effect is enhanced by the design of the back of the front seats. The seats themselves are low, and the back projects much less above the top of the body than in the ordinary design. The back is surmounted by a distinctive cowl, and although this cowl is flush with either edge of the body at its extremities, it is covered with the smooth dull leather used in the upholstery, so that it does not seem to break the straight sweep of the body line from windshield to the kick-up at the rear.

New Idea in Upholstery

Of the body details, most noticeable, perhaps, is the upholstery—one feature of the automobile which has changed very little in appearance since the early days. An idea of the manner in which the Stearns company has broken away from the customary design may be gained from the accompanying photograph showing the interior of the four-passenger model. The upholstery is of smooth, dull-finished leather, the seats and back cushions being crossed laterally on each surface by a narrow band of the same material. Attached to these bands by small square leather plaques are similar bands which extend over the edges of the cushions. Each of the small leather plaques carries four small buttons, the bands and buttoned plaques together giving just the right relief to the general smoothness. A de-

cidedly novel and attractive effect has been produced without losing any of the traditional comfort of soft upholstery.

Arm-Rests Are Round

The arm-rests, instead of being merely an extension of the upholstery along the top of the body, are of the round type familiarized by the leather arm chair, and are placed below the edge of the body, one of them also dividing the rear seats, as shown in the photograph. None of the upholstery projects above the top of the body, although the dull leather is carried over the top edges of body and doors, as well as over the cowl-back of the front seats.

Extra Seats Fold in Floor

Another radical departure from the ordinary design is seen in the auxiliary seats of the six-passenger car. When not in use they are practically invisible, the legs, or rather supports, forming part of the tonneau floor and the seats and backs being hidden by the leather curtain back of the front seats. One of the photographs shows this construction—the chair nearest the camera being folded down and the further one in position for use. A single upward pull places each chair in position—an excellent example of increased facility in handling without sacrifice of comfort.

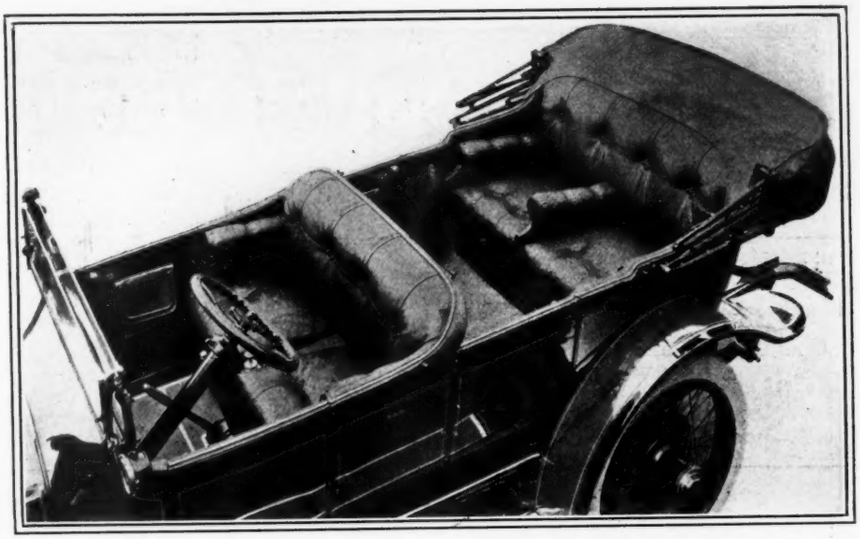
Both Have One-Man Tops

In addition to these new features of body design, both the four and six-passenger models are equipped with one-man tops especially designed for quick handling. The method of raising these tops is indicated in one of the photographs of the four-passenger car. From the position shown the top is carried forward over the operator's head, and clasped to the top of the windshield at each side by a ball-and-socket arrangement. The time and effort required to place the top in position are reduced to a minimum.

The elements of time and convenience have also been considered in the design of the side-curtains, which may be placed in position very quickly. When not in use they are suspended in neat rolls from the top bows—out of the way, yet instantly accessible.

Two Models Are Uniform

The four and six-passenger cars are uniform in construction throughout, except of course that the six-passenger type is longer and carries auxiliary seats. In general body design, trimming and detail finish the two models are alike, and in addition they embody convenient appointments and complete equipment. Replete with distinctive features, these new cars show an important advance in motor car design affecting both appearance and utility.



Interior of the new four-passenger light touring car, showing novel upholstery

Side curtains are rolled up in the top bows when not in use on the new Stearns-Knight

The new type of folding auxiliary seat used in the Stearns-Knight six-passenger touring cars. The one in the foreground is folded down so that it forms a part of the floor. When it is desired to use one or both of the seats this portion is lifted up and assumes the position shown in the background. When these seats are folded down they are practically invisible, the seat in back being concealed by the leather curtain on the back of the front seats

The Automobile

PUBLISHED WEEKLY

Vol. XXIX Thursday, November 13, 1913 No. 20

THE CLASS JOURNAL COMPANY
H. M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
231-241 West 39th Street, New York City

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Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

The British Field

THE report of companies selling cars in Great Britain during 1912, published in this issue, shows that America is lagging far behind European countries in the value of stripped chassis shipped into the British Isles, whereas American builders of medium and low-priced complete cars occupy a commanding position in the British trade. It is true that the British buyer is more or less of a shopper and looks upon his motor car much as he does on a new overcoat or as madam does on her new fur garment. Like the garments, the car is a part of the family's social presentation. Due to this innate characteristic, the British buyer of high-powered machines buys the chassis and has the body built to meet his whims, or requirements, according to his temperament.

France, due to her proximity, was quick not only to grasp the buying possibility of the British Isles but also to interpret merchandising secrets and every French maker has found a fruitful market. Italy, Germany and Belgium have fattened proportionately on John Bull's trade. The American builder has, according to the figures, not taken advantage of the field in proportion to his product, when compared with the products of European countries.

To take advantage of the British market means to do business as the Briton does business. In a word, do business as some of our best low-priced makers have and are doing business. There is still a field for such American business, but it cannot be stampeded. Shipping 100 cars, electric signs and big selling forces will not accomplish the end. The Britisher, like the continental countries, must see indications of permanency. He knows that parts will wear out, that replacement will have to be made, and unless he sees some possibility of a good supply of spare parts being permanently carried in London he is not anxious to invest.

There is yet good opportunity for the American builder of high-powered cars to get into the British market, but not with his largest motor models. The British maker has been compelled to drop his big sixes and his big fours, and it would be business suicide for an American maker to accomplish what the home makers have had to abandon. Our medium and high-priced chassis should have an equal chance with the French, the Italian, the German or the Belgium, providing the goods are on the counter that the buyer wants.

An export trade, such as the British Isles affords, is a good safety valve. It is never well to have all your eggs in one basket, and if the business at home is dull the field in Europe, in Africa, in Australia, in Russia or in South America may be particularly good. A healthy, widespread export business is a particularly healthy one, and one to which our larger makers should give more attention.

Honor System with Convicts

TWENTY-SIX of our forty-eight states have now legislation permitting the use of convicts for road building, one-half of these having placed these statutes on the books during the present year. Every one of these twenty-six is making good where the plans are being carried out in a business-like way, according to the requirements of the state.

Of these twenty-six states, perhaps Colorado has gone further than any other state in granting freedom to convicts while working without guard on the highway, Warden Tinan aiming at rebuilding characters in these men while rebuilding the highways of the state. Illinois during the present season has tried an experiment as bold as that in Colorado and Warden Allen in his Camp Hope enterprise has satisfactorily demonstrated that convicts, carefully selected from the prison cells, can be given their freedom in road building without danger of their endeavoring to escape.

Colorado and Illinois have proven that in a percentage of so-called convicts there is much more than a spark of manliness and honor left, a spark not smouldering but ready to burst into a flame at the slightest opportunity. The convict who gives his word to remain true to the warden in the road building camp and makes good is on as high a level of honesty as scores of our road officials, who have the awarding of contracts from state funds and who have their favorite contractors and favorites who sell road-making materials. He is on as high a level as some road contractors in the East who have taken state money for highways that have been worn out within 6 months after their completion.

The Colorado and Illinois examples in the honor-system in convict labor is a leaven, that will be welcomed in many departments of good roads work, and where a warden has that high sense of honor and that ability to judge human nature, which are needed in selecting convicts, he will prove a fit man to pass on road work.

Detroit S. A. E. Discusses Electric Shift

Intense Interest Indicated by Record-Breaking Attendance

DETROIT, MICH., Nov. 10—The regular monthly meeting of the Detroit Section of the Society of Automobile Engineers was held on November 6, and with electric gear shifting up for consideration, the largest attendance of the year was recorded. If the interest thus shown by the Detroit engineering fraternity is any criterion, the prediction may be made that the hand gear shifting lever is nearer general abandonment today than was the starting crank 2 years ago.

The four papers of the evening each dealt with a related phase of the subject of electric shifting of the gears and were handled by experts in each line.

Naturally the talks centered around the Vulcan device, and W. A. McCarrell, chief engineer of the Vulcan Motor Devices Co., opened the series of talks with a general review of the subject and a description of the Vulcan mechanism which was set up in working order. "The problem which had to be solved," said Mr. McCarrell, "divided itself into several parts. In order to change gears there must be some means of shifting them, some selective mechanism for determining which gear is to be moved, and some method of preventing the shifting of gears when the clutch is in engagement."

Electric, Mechanical and Pneumatic Power Available

When this problem was attacked 6 years ago, there were mechanical, electrical and pneumatic power available. The tendency toward electric lighting and starting finally lead these particular investigators to develop their device on the electrical principle, combining with it also a mechanical action.

In a gearset of three or four speeds forward and reverse it is necessary to draw the gears to neutral before any other gear is shifted. In the Vulcan this is done mechanically by what is known as the neutral cam or rocker arm which is actuated by springs and is connected to the clutch pedal. The gears are drawn into mesh by the electro-magnets, one for each gear. These electro-magnets, encased in cylindrical housings, are placed opposite each other so that one rod serves for two cores and also carries the forks that move the gears.

The whole device is carried in a case which bolts directly to the top or on the side of the gearcase. Cuts of these two types of installations have been shown in previous issues of THE AUTOMOBILE.

Mr. McCarrell went carefully into the construction of the different parts, how they are protected against the weather, and among other points, how each terminal in the terminal block is of a different size so that if the wires are all disconnected they are sure to be replaced in the right order. The operation of shifting gears was also shown. If it is desired to start the car from rest, the first speed button of the selector switch located on the steering column is pressed down. This causes nothing to happen, however, until the clutch pedal is thrown clear down. It is then that the operations of the device start, for the master switch is closed and through the selector switch the first speed coil is energized, drawing the gear into mesh.

The clutch is then let in and the car moves in the usual manner. It is possible to slip the clutch in the ordinary way at any time without affecting the shifter which only comes into play when the pedal is carried its full throw which is well beyond the point of full clutch disengagement. Now that the first speed has been engaged, the button for the next speed desired may be pressed down, the first button flying back to place since the switch is so made that no two buttons can be down at once. When conditions are right for the change already selected the clutch is thrown down and the shift is immediately made.

The number of operations of the shifter are this time greater than in the shift from neutral to first. This is because the throw of the clutch pedal first brings into play the neutral cam which returns the gears to the neutral position before tripping off the dog which closes the master switch. The whole sequence of operations, however, seems to take place instantaneously.

Besides the big field the electric system of gear shifting opens for the increased use of gasoline cars by women, Mr. McCarrell pointed out a second important advantage in that it was impossible to strip the transmission gears in the case of a Vulcan installation. The reason is that the gears are not changed until the clutch pedal is fully depressed and thus the motor torque is sure to be relieved when the shift takes place. The shift is so extremely rapid that there is no danger of dropping the clutch back in too quickly.

Probably one of the most important opinions expressed at the meeting was that given by R. W. Griswold, president and general manager of the Vulcan company, in a conversation following the program. Mr. Griswold believes that this non-gear-stripping factor is a powerful argument for a much greater standardization of change speed sets and he is making every effort to bring about such a standardization in design. Where the transmission specialist now makes four sizes of gears, each guaranteed for only a small range of horsepower, it is plain that, with the stripping bug-a-boo dispelled, he can standardize his product to only two sizes of transmission which will serve efficiently over the same total range of power as before.

The second paper, under the title of "Electro-Magnets," was read by Charles R. Underhill, of the Acme Wire Co. With the help of off-hand sketches on the blackboard he brought out in a very clear and interesting manner the fundamental principles of the solenoid, the bar electro-magnet, the simple solenoid with its movable plunger, and the horseshoe electro-magnet.

The horseshoe type has great holding power, but little attraction through any considerable distance. When a strong pull through quite a distance is desired, the solenoid or coil of wire with a movable plunger is employed. Mr. Underhill explained carefully the magnetic circuits and reactions of such a set up and showed how the pull on the plunger increased until its middle point had practically reached the center of the coil, after which the pull fell off, due to an apparent repulsion beyond this point of travel.

In the case of the horseshoe electro-magnet, the pull curve, plotted between the armature attraction and the air gap, approximates that of the rectangular hyperbola, the pull approaching infinity as the air gap approaches zero.

Thus by a combination of these two forms of electro-magnets a constantly increasing pull may be exerted through the total travel of the plunger.

In closing his paper, Mr. Underhill brought out that there was no question as to the reliability of electro-magnets for gear shifters by citing the common uses to which electro-magnets are put, where reliability is one of the greatest factors of the service.

R. J. Nightingale, of the Willard Storage Battery Co., was to have given the third paper, dealing with the storage battery problems in electric gearshifting, but he was unable to attend the meeting. However, W. H. Conant, of the Gould Storage Battery Co., covered the subject in a broad way in an extemporaneous talk.

In bringing the formal part of the meeting to a close, Frank N. Nutt, chief engineer of the Haynes Automobile Co., talked on "The Application of the Electric Gearshift from an Automobile Engineer's Standpoint." He was first impressed with the device due to the noiselessness of gear changing on the demonstrating car the makers had at the 1912 New York Show. He had a specially built outfit put on his own car for the purpose of carrying on experiments as to the best strength of coils, and so forth. The pull of the electro-magnets with the plunger 1 1/16 inches away was increased until 40 pounds was determined upon as being desirable. The question of thick lubricants in cold weather entered into the decision.

Storage Battery Presents Problems in Electric Shift

W. H. Conant, Gould Storage Battery Co., spoke of storage battery problems in electric gearshifting. Mr. Conant emphasized the importance of making the original battery equipment of sufficient size as such a one has a life many times greater than the ratio of its capacity to that of an undersized battery.

Mr. Conant's second plea was for accessibility of battery location. Although the battery does not need frequent attention, yet if it is handily placed it is far more likely to receive the care that its growing importance warrants than if it is hidden under the body as is now the tendency in the desire for clear running boards. It is up to the engineer, therefore, to find a good place for the battery.

In the discussion, Mr. McCarrell said that the neutral cam and the various interlocking devices were a sufficient safeguard to prevent the burning out of the electro-magnets even if anything should go wrong and for that reason no fuses are used.

Mosler Gets Broad Spark-Plug Injunction

Court Upholds Canfield Patent on Recess Behind the Electrodes—Attorney Claims Every Spark-Plug in Country Is Infringement

NEW YORK CITY, Nov. 12—Judge Lacombe handed down a decision in the United States Court of Appeals yesterday which, according to W. A. Redding, attorney for A. R. Mosler & Co., the complainants, will have an important and immediate effect upon every spark-plug manufacturer and dealer in the country. The decision, which is concurred in by Judges Ward and Rogers, upholds the Canfield patent in spark-plug manufacturing and gives an injunction prohibiting John Lurie from selling six makes of spark-plugs on the ground that these plugs infringe the Canfield patent, owned by A. R. Mosler & Co.

According to Mr. Redding, practically every spark-plug manufactured or sold in this country is an infringement of the Canfield patent and the makers will either have to stop making them or will have to pay tribute to the owners of the patent.

The suit for an injunction was first filed in 1909 and Judge Mayer, in the Circuit Court, dismissed it. Mr. Redding carried the case to the Court of Appeals and has now won it.

For years manufacturers of spark-plugs have gone ahead making them, not knowing that any basic patent was out. The patent as upheld by the Court of Appeals applies to a recess behind the electrodes. This recess is necessary to keep the region around the electrodes free from carbon or soot of any kind; without it the electrodes would become clogged and either no spark or too faint a spark would result.

These are the manufacturers whose spark-plugs were sold by John Lurie: C. A. Mezger, maker of the Mezger plug; the Champion Ignition Co., Flint, Mich., the American Coil Co., Foxboro, Mass., the Rajah Auto Supply Co., Bloomfield, N. J., the makers of the Belgique plug; the Standard Sales Co., New York City.

The inventor of the recess was Frank W. Canfield, a lumber man of Manistee, Mich. He knew little about gasoline engines, but he did know that a candle will not burn at the bottom of a deep well, so he applied the candle-in-the-well principle to a spark-plug.

He patented it October 18, 1898. He died in 1899, and the ownership of the patent passed through several hands without much use being made of it until the Associated Patents Co. got hold of it.

The association is made up of fifty large automobile manufacturers in the country. The association licensed each member to make use of the Canfield patent and then sold it to Mosler, who has been trying to enforce it ever since.

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MILWAUKEE, WIS., Nov. 10—Grant F. Discher, president and general manager of the Garage Equipment Mfg. Co., of Milwaukee, has filed suit in the Federal court at Milwaukee against the Milwaukee Auto Specialty Co. on charges of infringement of patents on brackets for bumpers or protecting guards. Mr. Discher is suing for an injunction and an accounting.

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Weed Wins in Tire Chain Suit

NEW YORK CITY, Nov. 12—On appeal from a final decree in equity, Judge Coxe, in the United States Circuit Court of Appeals for the Second Circuit, has decreed that the product of the Parsons Non-Skid Co., Ltd., the Weed Chain Tire Grip Co., and Harry D. Weed, has been infringed by the E. J. Willis Co.

The patent, No. 723,299, has been in general and continuous litigation for the last 3 years and has been sustained and infringement found in twenty-four instances. Appeals have been taken in at least five of these cases, resulting in each case in an affirmance of the decree of the lower court finding validity and infringement of the patent. These decisions are by the Circuit Court of Appeals of the Sixth, Seventh and Second Circuits.

"If it is possible," says Judge Coxe, "in a patent cause to reach a stage where everything that has the remotest bearing on the issue has been said and where every question relating to the validity of the patent has been decided, this would seem to be such a case. All the important questions have been decided over and over again by the unanimous judgments of twenty-four tribunals, six of them being courts of appeal. We have been unable to find a single vital proposition advanced at this hearing which has not been decided against the defendants over and over again.

"It can hardly be expected, with such an unbroken current of authority in favor of the patent, that this court will discard its former decision and hold the Parsons patent invalid unless new and cogent proof is presented which convinces us that the long array of prior decisions has been erroneous. No such proof has been presented."

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LANSING, MICH., Nov. 10—The Weed Chain Tire Grip Co., New York City, has secured an injunction against the Perry Chain Mfg. Co., Lansing, Mich., restraining the latter from making a certain type of non-skid chain for motor cars which is held to be an infringement of the Weed patents. The decision was handed down by Judge Tuttle in the United States District Court at Detroit. The Perry concern states that it expects to make an appeal from this ruling.

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Petitions Supreme Court to Advance Case

WASHINGTON, D. C., Nov. 11—*Special Telegram*—Counsel for J. Thilman Hendrick, motor truck owner, of Washington, today petitioned the Supreme Court of the United States to advance his case on the docket. The case combats the power of the State of Maryland to tax motor cars doing an interstate business when they enter Maryland.

The Hendrick case is an action carried before the Supreme Court to test the constitutionality of the Maryland motor tax and registration law, so far as it applies to automobiles owned by Washingtonians and passing over the Maryland roads.

The petition, in part, sets forth:

"While certain provisions of the Maryland statute permit temporary free entry into the State of Maryland by the residents of all states of the Union, without the payment of any license or registration fee, that law specifically provides that this so-called privilege is to be denied to the residents of the District of Columbia, thus discriminating against them as a class.

The Supreme Court is asked to advance the case so that a decision may be rendered before the 1914 tax becomes due in Maryland.

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Final Decree in Rose Suit

NEW YORK CITY, Nov. 10—A decision rendered on January 23, 1913, in the United States District Court for the District of New Jersey by Judge Cross in the suit of the Rose Mfg. Co. vs. the E. A. Whitehouse Mfg. Co., and the Le Compte Mfg. Co., dismissed the bill of complaint with costs. The bill alleged infringement of the Rosenbluth and Hughes patents owned by the Rose company, by the defendants. An appeal from the decree was made by the Rose company charging infringement of two mechanical patents and two design patents, said patents being Nos. 883, 973, 962, 220, 41,388 and 41,389, respectively. The defendants were charged with conjointly embodying the alleged inventions of the several Letters Patent in the alleged infringing articles manufactured by them. Both of the mechanical patents relate to brackets arranged to support a lamp in detachable relation to a vehicle body, such as are adapted more especially for use on automobiles, to support and illuminate the number or license placed thereon. The design patents are stated to be for new and original ornamental designs for vehicle number-plate supports. The court has now handed its answer to the appeal of the appellants, stating that the decree of the court below is affirmed.

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Permanent Injunction on Valve Tool Patent

NEW YORK CITY, Nov. 12—Judge Brown in the United States District Court of Rhode Island has decreed that Bernard Morgan's invention, patent No. 1,050,746, which was granted for improvements in a valve tool, is a direct infringement of the earlier Bryant patent, No. 1,008,694. This patent is a valve tool,

as was said above, for use in removing valve springs from automobile motors and replacing them. This patent is now held by Louis Schwab, who appears as the complainant in the suit against Morgan. The device of the patent in suit comprises a stock or body piece of cylindrical form and a carrying rod mounted to move endwise in the bore of the body piece. The carrying rod has at one end a spring-engaging member, U-shaped or forked, so that its two sides may be pushed into the spring on either side of the valve stem, being made sufficiently thin to enter readily between the coils of the spring; the prongs or forks being of sufficient width to enable the member to engage properly, springs varying considerably in diameter. The body piece in which the carrying member moves has a U-shaped or forked jaw. The spring may be compressed or extended by the relative movement of the jaw. In claim 3 the means for moving the carrying member to cause relative approaching or separating movements between the engaging members are claimed broadly; the only limitation being contained in the words "mounted on the stock piece."

I. M. C. Minority Demands Dissolution

NEW YORK CITY, Nov. 10—Last Friday's proceedings in the Brooklyn Supreme Court, in connection with the injunction proceedings against the International Motor Co., failed to bring out the expected decision of the court or to untangle the situation sufficiently to permit any very clear view as to whether the company is to be allowed to negotiate the $1,200,000 loan which is admittedly necessary for its further continuance.

The additional affidavits filed on Friday contained the original reports of the appraisals made of the Mack Bros. Motor Co. assets and those of the Saurer Motor Co. These papers include the deposition of Willard L. Case, a consulting engineer, who worked in conjunction with the North American Audit Co. in appraising the assets of the Saurer company, preliminary to the purchase of the motor companies by the International. This deposition relates chiefly to the alleged discrepancy between the appraisal of the North American concern and that of Ernst & Ernst.

The figures by the North American company showed that the net worth, exclusive of patents and good will, of the Saurer company, as of August 31, 1911, was $4,523, while Ernst & Ernst's appraisal showed $538,992. The net worth guaranteed by the company was $600,000, so that the latter's appraisal showed a deficit under the guarantee of $61,008, and the former's appraisal showed a deficit under the guarantee of $595,477.

A decision as to the motion for a receivership will probably be handed down by Judge Garretson in the Supreme Court in Brooklyn about the middle of this week. In the meantime the voting trustees of the International have postponed their meeting to take action on a proposed loan until November 14. It is not expected that the suit for the dissolution of the contract by which the International took over the Mack and Saurer companies will come up before late winter or early spring.

NEW YORK CITY, Nov. 11—The case of the Whitney Motor Wagon Co. vs. the Prescott Automobile Mfg. Co., which has been running in the United States District Court for the Southern District of New York since 1902, has been dismissed without costs to either party.

NEW YORK CITY, Nov. 11—The suit of the H. J. Koehler Sporting Goods Co., of this city, against the E-M-F Co., Detroit, Mich., for $100,000 damages for breach of contract, has been settled out of court.

New M. A. M. Members

NEW YORK CITY, Nov. 7—The following concerns have been elected to membership in the Motor and Accessory Manufacturers: The Overman Tire Co., New York City; The Bossert Co., Utica, N. Y.; the Waltham Watch Co., Waltham, Mass., and the Wagner Electric Mfg. Co., St. Louis, Mo.

Allen Auto Specialty Co. Wins Tire Cover Suit

NEW YORK CITY, Nov. 7—A decree has been handed in by Judge Hand in the U. S. District Court for the Southern District of New York, in favor of the Allen Auto Specialty Co. against the Niagara Auto Cover Co.

It will be remembered that, in November, 1911, a suit was filed by the complainant, alleging certain infringements on a tire cover. Then the complainant discontinued that style of cover and placed on the market a new tire cover, which was the basis of a new suit on March 7, 1912, involving an infringement of another phase of the Nathan patent, number 799,662, granted to him on September 19, 1905, and assigned by him to W. A. Allen, who in turn assigned to the Allen Auto Specialty Co. In this last suit the principle involved was the water-shedding feature covered by the patent.

Judge Hand in his decree says:

"There is no important issue in this case except infringement and that is a purely verbal issue. That anyone should copy the patent exactly, except to put the top section wrong side to, was surely not to be anticipated. It is so obviously a perversion of the natural use as to be possible only to one who was trying to avoid infringement. The most that Mr. Campbell could say for it was that the cover would work as well hind side in front as the normal way. Granting that this is true, though it seems to me most unlikely, still he could not suggest the least reason for the change, and the real reason is only a dishonest wish to infringe the patent.

Standard Welding Answers Perlman

NEW YORK CITY, Nov. 11—The suit of Louis H. Perlman against the Standard Welding Co. and against the Packard Distributing Co., Trenton, N. J., promises to be a very interesting one. Mr. Perlman claims an alleged infringement on his patent on demountable rims, No. 1,052,270, which covers a combination, in a wheel, of a wheel body and annular abutment, of a rim composed of overlapping sections, and the necessary arrangement of lugs inserted and wholly counterset within the rim. The suit against the Packard company is based on the offering of Firestone demountable rims on Packard cars. These rims, he claims, are an infringement of his alleged basic patent. The Firestone Tire & Rubber Co. itself some years ago won a suit in which it was the plaintiff in a litigation over a demountable rim patent. The same attorney who represented that company in the suit will take up the defense of the Standard Welding Co.

The Standard Welding Co. has now answered Mr. Perlman. In its answer it admits that on February 4, 1913, patent No. 1,052,270 was issued to Mr. Perlman, but that it denies the issuance thereof secured any valid exclusive rights whatever. It also denies that Mr. Perlman was at any time the original and first inventor of the alleged improvement in wheels claimed in the patent.

The defendant avers that the patent is invalid because the subject matter of the said letters patent had been prior to the alleged invention patented or described in the U. S. Letters Patent Nos. 4,447, 405,710, 422,349, 481,762 and twenty other patents. It also brings in eleven British patents, three German, and one French patent, No. 437,651, issued to G. Vinet.

Edison Sues Horn Concern

CHICAGO, ILL., Nov. 10—Thomas A. Edison has started a suit in the United States District Court in Chicago to restrain the Consolidated Gas & Electric Co. from using the name "Edison Self-Starter," and the "Edison Electric Horn," which are the products of that company. Mr. Edison states in the bill of complaint that he has no connection with the invention of these devices or the patenting of them. It is to protect the name "Edison" that the suit has been brought.

Lozier Has Six and Four for 1914

DETROIT, MICH., Nov. 10—First announcement of Lozier plans for the coming year were made at the offices of the Lozier Motor Co., recently. In addition to the new four-cylinder car, a new series light six is being introduced with new features of construction. A tendency toward reduction of weight is one of the features. Mechanical improvements on the six are in the nature of ease and silence of operation. Cloth timing gears and valves inclosed, are new this year. The six-cylinder motor with a bore of 3.88 inches and a stroke of 5.5, shows 62 horsepower on brake test. The motor and transmission are assembled as a unit. A new feature is the direct drive through rear springs. This is claimed to eliminate extra weight from the rear of the car. Left side drive and center control will be, as usual, used.

JEFFERSON CITY, MO., Nov. 10—Governor Elliott W. Major this week received assurances from twenty-eight governors that they would attend the convention of the United States Good Roads Assn. in St. Louis, November 10-15.

U. S. Exports $1,466,322

1,711 Cars and 48 Trucks Exported in Sept.—37 Cars Imported—British Take Over Half of Exports

WASHINGTON, D. C., Nov. 12—*Special Telegram*—According to figures made public today by Bureau of Statistics forty-eight commercial cars valued at $91,054 and 1,711 passenger cars valued at $1,466,322 were exported in September as against forty commercial cars valued at $85,997 and 1,550 passenger cars valued at $1,352,531 shipped abroad during corresponding month of last year. Exports of parts were valued at $282,287 in September a year ago and $463,134 in September last. During the 9 months ended September last 778 commercial cars valued at $1,351,140 and 20,175 passenger cars valued at $19,950,718 were exported. The total number of commercial and passenger cars exported during same period last year was 18,406, the value $18,252,299. The exports by countries during September last were:

Country	Cars	Value
United Kingdom	469	$310,099
Other countries	272	213,319
British Oceania	261	219,147
Canada	253	345,095
Asia and other Oceania	139	145,248
South America	126	123,817
Other Europe	94	67,413
France	48	41,745
West Indies	48	40,265
Germany	27	13,504
Mexico	15	33,169
Italy	7	4,555

There were thirty-seven cars, valued at $79,079 imported in September as against eighty-three, valued at $165,646 imported in the same month last year.

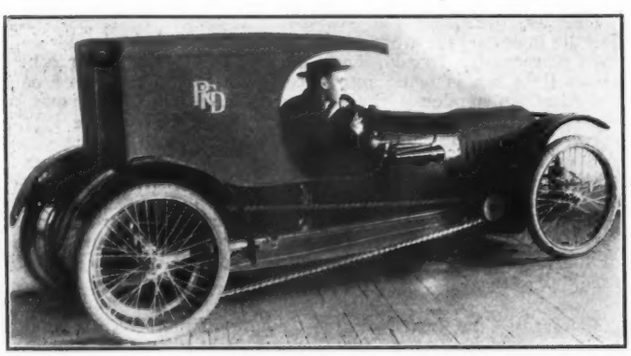
Gasoline Drops 1 Cent

NEW YORK CITY, Nov. 11—The Standard Oil Co. of this city, has reduced the price of automobile gasoline 1 cent, establishing a basis of 16 cents in drums and 20 cents a gallon in wooden barrels. This is the first change in price since January.

AKRON, O., Nov. 11—The regular cash dividend of 12 per cent. on common stock was declared at a meeting of the directors of the Goodyear Tire & Rubber Co. at Akron last week. The annual factory inventory is now complete and manufacturing operations in full force have been resumed for the 1914 run. In automobile tires the Goodyear factory capacity is now 10,000 a day, besides the quantity of motor truck tires, carriage tires, motorcycle and bicycle tires that are regularly turned out. Goodyear output increased in 1913 from $26,000,000 to $33,000,000, despite the handicap of strike and flood.

Pope Made Receiver Despite Opposition

HARTFORD, CONN., Nov. 7—Although there was considerable opposition to the appointment of Colonel George Pope as the sole temporary receiver of the Pope Manufacturing Co. at a hearing held before Judge Joseph P. Tuttle in the Superior Court this morning, Colonel Pope and C. A. Morse, of Boston, were made receivers. Hearing as to a permanent receiver is to be held in the Superior Court December 5. Judge Tuttle said his duty was clear. It had been proved to his satisfaction at the hearing that the Connecticut practice of having hearings on confirmation of temporary receivers is wise. Four weeks hence, he remarked, would be the first time that the matter could be brought before the court for a hearing on the appointment of a permanent receiver.



Neat-looking delivery body fitted to Imp cyclecar chassis

DETROIT, MICH., Nov. 11—The public auction sale of the property of the R. C. H. Corp., which was held this morning did not bring forth any bids which were acceptable to the receiver. A bid of $164,000 for the entire assets was made by Harry F. Grant, representing besides himself, J. F. Hartz, C. P. Seider and Chas. F. Beardsley. A meeting is scheduled for November 17. The company was adjudicated a bankrupt Nov. 6 by Lee Joslyn, referee in bankruptcy.

Gerber Buys Abbott Outright

DETROIT, MICH., Nov. 11—The Edward F. Gerber Co., Pittsburgh, Pa., has purchased outright the Abbott Motor Co. The deal was closed at a meeting of the chief stockholders November 8. The ratification of the sale includes about 90 per cent. of the stockholders.

The proceeds of the sale will go to the merchandise creditors of the Abbott company, while according to the present plan, E. M. Knapp and his associate stockholders will, by taking up the bank indebtedness, be released from any other indorsements made.

The Gerber firm intends to continue the making of Abbott cars.

Trumbull Cyclecar on Market

BRIDGEPORT, CONN., Nov. 11—The American Cyclecar Co., of this city, is now manufacturing the Trumbull cyclecar. This has a four-cylinder four cycle block engine. It has a bore of 2.88 and a stroke of 4 inches, and is water-cooled. The valves are mechanically operated. The horsepower is 14-18 at normal speed. Power is transmitted from the motor through a propeller

Automobile Securities Quotations

No changes of any importance occurred in this week's automobile securities quotations. Most all of the prices stayed within a few points of last week's quotations.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Company, com	175	190	150	..
Ajax-Grieb Rubber Company, pfd	98	102	94	100
Aluminum Castings, pfd	100	102	98	100
Chalmers Motor Company, com	..	..	..	98
Chalmers Motor Company, pfd	..	..	..	96
Consolidated Rubber Tire Company, com	10	15	30	35
Consolidated Rubber Tire Company, pfd	50	55	85	95
Firestone Tire & Rubber Company, com	278	285	260	270
Firestone Tire & Rubber Company, pfd	105½	107	103½	104½
Garford Company, p.d	99	100	85	90
General Motors Company, com	33	35¼	36	37½
General Motors Company, pfd	77	78	74	77
B. F. Goodrich Company, com	70	71	17½	18½
B. F. Goodrich Company, pfd	107	107½	80	81
Goodyear Tire & Rubber Company, com	400	410	..	250
Goodyear Tire & Rubber Company, pfd	104½	105½	96½	98
Gray & Davis Company, pfd	..	..	96	102
Hayes Manufacturing Company	..	90	..	..
International Motor Company, com	18	20	..	5
International Motor Company, pfd	74	76	..	15
Kelly-Springfield Motor Truck Company, com	..	..	50	60
Kelly-Springfield Motor Truck Company, pfd	..	..	90	101
Lozier Motor Company, com	..	..	15	..
Lozier Motor Company, pfd	..	..	..	92
Maxwell Motor Company, com	..	..	2¼	2¾
Maxwell Motor Company, 1st pfd	..	..	19	21
Maxwell Motor Company, 2d pfd	..	..	5¼	6¼
Miller Rubber Company	143	147	130	135
New Departure Mfg. Company, com	..	..	168	177
New Departure Mfg. Company, pfd	..	..	103	107
Packard Motor Company, p.d	105½	107	..	95
Palmer & Singer, pfd	..	..	..	65
Peerless Motor Company, com	..	..	25	35
Peerless Motor Company, pfd	..	..	85	90
Pope Manufacturing Company, com	26	28	1	3
Pope Manufacturing Company, pfd	70½	72	14	20
Portage Rubber Company, com	..	..	..	35
Portage Rubber Company, pfd	..	..	..	92
Reo Motor Truck Company	8½	9½	..	7½
Reo Motor Car Company	20	22	15	16½
Rubber Goods Mfg. Company, pfd	..	..	100	106
Russell Motor Car Company, com	..	..	..	40
Russell Motor Car Company, pfd	..	..	..	70
Splitdorf Electric Company, pfd	..	..	50	55
Stewart-Warner Speedometer Company, com	..	..	62	65
Stewart-Warner Speedometer Company, pfd	..	..	95	98
Studebaker Company, com	41	43½	16¾	17½
Studebaker Company, pfd	94½	97	65	67
Swinehart Tire Company	99	101	80	85
U. S. Rubber Company, com	..	..	52	53
U. S. Rubber Company, 1st pfd	..	..	98⅝	99⅝
Vacuum Oil Company	..	..	71	73
White Company, pfd	105	108	105	110
Willys-Overland Company, com	..	..	62½	64
Willys-Overland Company, pfd	..	..	84	92

shaft to a friction disk under the seat. The control is composed of a left-hand drive, one hand lever for all speeds, and four forward and reverse. Quick detachable wire wheels are used. The wheelbase is 80 inches and the tread 44. It has a speed of 45 miles per hour and weighs 650 pounds. The price is $425.

Receiver Wanted for American

INDIANAPOLIS, IND., Nov. 12—*Special Telegram*—Columbus Lithographing Co., Columbus, O., Globe Machinery & Stamping Co., Cleveland, O., and Gardner-Bryan Co., Cleveland, O., creditors, have filed a petition in the United States court here asking that the American Motors Co. be adjudged bankrupt and that a receiver be appointed. Judge Albert B. Anderson has named Frank E. Smith, vice-president of the company, as receiver, and he qualified by giving a $35,000 bond. Smith was appointed receiver for the company in County Courts recently.

New Vaughan Car on Exhibition

NEW YORK CITY, Nov. 11—The new Vaughan six-cylinder car is on exhibition all this week at the Hotel Astor. The body and the chassis of the car show perfectly clear, clean lines. It has a narrow D radiator, with the body sloping back from it in such a way as to give very little wind resistance. There are no tool boxes, battery boxes, tires, lamps or brackets of any description to obstruct the lines of the car. A six-cylinder block motor is used. It has left drive and center control and the Bijur electric system is fitted. A novel feature is the clock placed on top of the steering column. The Rostand windshield is mounted integral with the cowl. A feature worthy of note is the width of the doors.

Correction on Velie Description

In the description of the 1914 Velie cars on pages 921, 922 and 923 of this issue, it should be noted that the Velie company has decided to call the small four-cylinder chassis model 5 instead of 4-35 and the larger model 9 instead of 4-45. Model 4-35 has cylinders 4 by 5.5 inches instead of 4.25 by 5.25, while the six-cylinder has tires 37 by 4.5 instead of 27 by 4.5.

Market Changes of the Week

A few changes of importance occurred this week. Both Bessemer and Open-Hearth steels dropped $1.00 per ton, closing on Tuesday at $21.00. Tin was again heavy, weak and lower at London and sympathetically prices were further reduced in the local market. There was very little interest shown by either consumers or speculators, tin closing at $39.25, at a loss of $0.40 per 100 pounds. Lead remained dull but steady. On call at the New York Metal Exchange November and December offered at $4.32 1-2 per 100 pounds, a decline of $0.02. Both electrolytic and Lake coppers suffered small losses. The situation in the local market for scrap rubber has undergone no change of consequence. The firmer tone which developed in the principal crude rubber markets of the world continued in evidence last week and in London the trend of prices was again upward. Up-river Fine closed at 76 at a gain of $0.01.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb...	.06¼	.06¼	.06¼	.06¼	.06¼	.06¼	.....
Beams & Channels, 100 lbs..	1.56	1.56	1.56	1.56	1.56	1.56	.....
Bessemer Steel, ton	22.00	22.00	22.00	22.00	22.00	21.00	—1.00
Copper, Elec. lb.....	.16⅛	.16⅛	.16⅛	.16⅛	.16⅛	.15¾	— .00 9/20
Copper, Lake, lb.....	.16½	.16½	.16⅜	.16⅜	.16⅜	.16	— .00½
Cottonseed, Oil, lb.	6.99	7.00	6.98	6.96	6.99	6.90	— .09
Cyanide Potash, lb.....	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.38	.38	.38	.38	.38	.38	.....
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime.	.95	.95	.95	.95	.95	.93	— .02
Lead, 100 lbs..	4.35	4.35	4.33	4.33	4.33	4.33	— .02
Linseed Oil....	.50	.50	.50	.50	.50	.50	.....
Open-Hearth Steel, ton....	22.00	22.00	22.00	22.00	22.00	21.00	—1.00
Petroleum, bbl., Kansas crude.	1.03	1.03	1.03	1.03	1.03	1.03	.....
Petroleum, bbl., Pa., crude....	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.64	.64	.64	.64	.64	.64	.....
Rubber, Up-River Para...	.75	.75	.75	.75	.75	.76	+ .01
Silk, raw Italy..	....	....	5.10	....	5.10	5.10	.....
Silk, raw Japan.	....	....	3.95	....	4.00	3.98	+ .03
Sulphuric Acid, 60 Baume....	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lbs....	40.15	39.90	39.85	39.90	39.90	39.25	— .40
Tire, Scrap.....	.07½	.07½	.07½	.07½	.07½	.07½	.....

Premier Adds $500,000

Schacht Co.'s Property Brings $16,350—Harvester Co. Monopoly—Imp Has Cyclecar Wagon

INDIANAPOLIS, IND., Nov. 10—*Special Telegram*—On November 3 the stockholders at the Premier Motor Mfg. Co., at a special meeting called for the purpose, authorized an increase of $500,000 in capital stock and a bond issue on $250,000, thereby providing a substantial increase in working capital. This was made necessary by the rapid increase in the company's business, which more than doubled in 1913 with the bringing out of a moderate-priced six.

Schacht Real Estate Sold

CINCINNATI, O., Nov. 11—*Special Telegram*—The real estate belonging to the Schacht Automobile Co. was auctioned off this afternoon. E. H. Huenfeld, a tinware man of this city, bought it in for $16,350, the real value being $26,000.

Declares Harvester Co. Is Monopoly

ST. PAUL, MINN., Nov. 6—Attorney-General James McReynolds, concluding final arguments for dissolution of the International Harvester Co. before the United States District Court this afternoon, asked that an interlocutory decree be entered by the court declaring the Harvester concern a monopoly in restraint of trade.

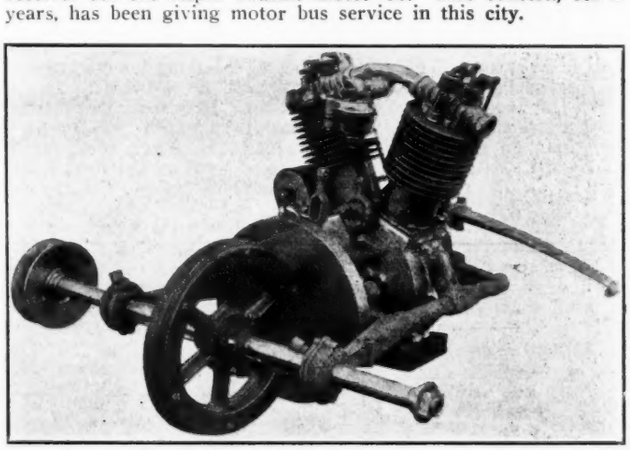
Correction on Rajah Injunction

THE AUTOMOBILE for November 6 stated that a permanent writ of injunction had been filed in the U. S. District Court of the Southern District of New York, by the Rajah against the Rex Ignition Mfg. Co., for alleged infringement of certain spark-plug features. This statement should read: "A permanent writ of injunction has been requested."

A Cyclecar Delivery Wagon

AUBURN, IND., Nov. 10—The Imp Cyclecar Co. has brought out a light delivery body, adaptable to the Imp Cyclecar chassis, shown in the accompanying illustration. It is being used by the free rural delivery. The front end of the top is so made that it can be swung back to allow the entrance of the driver. The body is 26 inches wide, 26 inches long and 42 inches high, and has a double rear door. It is of metal construction throughout and has a capacity from 200 to 300 pounds. The list price is $395. The motor, shown in the illustration, is of 10-horsepower. No gears are used in the car.

INDIANAPOLIS, IND., Nov. 11—On application of James T. Eaglesfield, a stockholder, James I. Gardiner has been appointed receiver for the Rapid Transit Motor Co. This concern, for 2 years, has been giving motor bus service in this city.



Imp cyclecar motor and friction transmission, showing unit construction

French Grand Prix for Lyons, July 4

Small Models Will Predominate —275-Cubic-Inch Limit— May Make 110 Miles Per Hour

PARIS, Nov. 1—France will hold her annual Grand Prix in the neighborhood of Lyons on Saturday, July 4, for cars having a cylinder area of not more than 4.5 liters, 275 cubic inches. All details in connection with this race were settled at a meeting of the racing board yesterday, thus giving manufacturers 8 months in which to prepare for what promises to be one of the finest long-distance road races ever held in France.

Next year's racing cars will be small models. Dimensions permissible under the cylinder allowance are 80 by 222 millimeters, 85 by 198, 90 by 177, and 85 by 156 millimeters. It is practically certain that all the competitors will have four-cylinder motors with a bore varying between 90 and 95 millimeters. A good average size will be 94 by 160 millimeters (3.7 by 6.29 inches). The problem of feeding a motor turning at such a high speed will be a difficult one. Pressure fed charge is being experimented with; other makers are studying a varying profiled cam with a longitudinal movement of the camshaft. Separate carbureters for each cylinder are also being adopted. In the majority of cases valves will be in the head, either inclined as is done by Hispano-Suiza and Peugeot, or horizontal as on the Delage racers, but in each case with a hemispheric combustion chamber. Ignition will be a difficult problem for this high speed work. Among the solutions will be two magnetos firing simultaneously or two eight-cylinder magnetos running at half speed and firing alternately. It is expected that next year's 275 cubic inch motors will develop 140 horsepower at 2900 revolutions. Weight will be practically the same as on this year's 3-liter models, namely 1800 pounds stripped and 2800 pounds in full racing trim. A speed of 105 to 110 miles an hour, over a level road, is looked upon as quite possible of attainment with next year's cars when running in road racing trim.

Course Is a Rough Triangle

The course is roughly triangular, the legs measuring about 4.6, 7.7 and 11 miles. The exact distance round is 23.3 miles, and as 20 laps have to be covered, the total will be 466 miles. The first leg, starting from Les Sept Chemins, 12 miles from Lyons, is short and of a fairly easy nature. It is a national highway at present in a moderate condition, but will be resurfaced entirely for the Grand Prix. To reach the second leg of the course the village of Givors has to be passed through in its entirety. This comprised a passage under the railway, 300 yards of paved road, and a right-angle turn in the heart of the village, the cars running from a paved to a macadam road. It is intended to relay the whole of this paved portion in order to secure a perfectly smooth surface. The second leg runs along the hillside overlooking the river Gier, and is known as "the road of a hundred bends." The hills are only short, but the winding nature of the road will put the drivers and their steering gear to a severe test. At the end of this leg there is a pronounced hairpin turn, followed immediately by a 2-mile winding hill of a difficult nature. The rest of the leg is a dead straightaway of a switchback nature, on which it will be possible to attain speeds of more than 100 miles an hour. It is towards the end of this stretch, and not far from the hairpin turn into the first leg, that the grandstands will be erected. After the grandstands there is a short winding descent to the hairpin and the first leg of the course. The course will necessitate the use of a car having a particularly lively getaway, while the four or five speed gearset will have to be very carefully worked out after a critical examination of every portion of the road and a study of the requirements.

Although entry blanks have not yet been issued, it is announced that 5-car teams will be admitted, and the entry fee will be $600 per car. There are promises of a large number of starters.

Boston's First Electric Automobile Salon

BOSTON, MASS., Nov. 8—The first electric automobile salon ever held in Boston is scheduled for the Copley Plaza ballroom here on November 17, 18 and 19. It is to be promoted by the Electric Motor Car Club of Boston and President Day Baker has appointed committees to take care of it. There will be about forty machines exhibited. The following firms will be represented by the cars named: Bailey: S. R. Bailey & Co.; Baker: Frank A. Phelps; Buffalo: W. L. Russell Co.; Columbus: Imperial Motor Car Co.; Detroit: Anderson Electric Car Co. of Boston; Rauch & Lang: Peerless Motor Car Co. of New England; Standard: W. H. Stevens; Waverley: J. W. Bowman Co., and the Woods: Whitten-Gilmore Co.

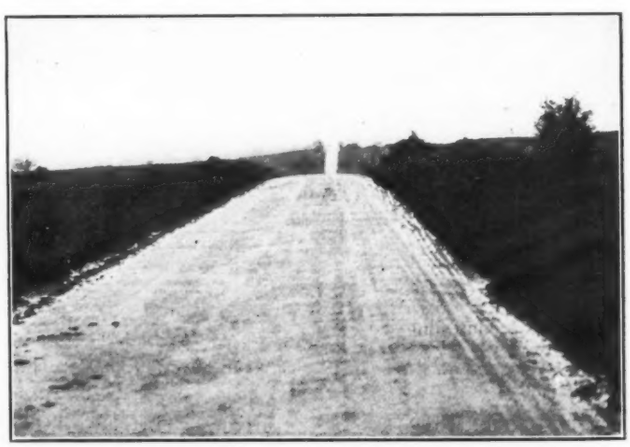
290,000 Paid To See Paris Show

PARIS, Oct. 28—With 290,000 persons having paid for admission at the turnstiles, the fourteenth Paris automobile salon came to a close last night, after having been open for 11 consecutive days. Taking into consideration the persons who had season passes and exhibitors' tickets, it is estimated that the number of visitors to the Grand Palais during the show period has not been under 400,000. Gate receipts total $58,317, the price of admission on the first and the last day being $1, 60 cents on another day, and 20 cents during the rest of the period.

Canada To Have Road Congress

MONTREAL, QUE., Nov. 10—The first Canadian Roads Congress, a national convention arising out of the crying needs in all the provinces for better roads, is planned to be held in Montreal about the end of January or the beginning of February. The federal and provincial governments are co-operating with the Automobile Club of Canada, as well as the local and foreign road associations, boards of trade, municipal and county councils, and societies in general, to make the congress a big educational feature.

ST. LOUIS, Nov. 10—The Missouri Athletic Club's first reliability run which lasted 4 hours, no record of distance made, was won by Miss Ethel Dawson. Miss Dawson, who was the only woman driver, had a perfect score of 1,000.



A 10-mile straightaway on the French Grand Prix course

Sharp turn of course over cobblestone in the village of Givors

Simplex Wins El Paso to Phoenix Race

Covers 517 Miles in 17 Hours and 10 Minutes—Stutz Is Second and Velie Third

PHOENIX, ARIZ., Nov. 5—The first annual race from El Paso to Phoenix was won by Newkirk in a Simplex. He drove the 517 miles in 17 hours 10 minutes. Johnson in the Stutz was second in 18:39 and Naquin in the Velie third in 19:17. Others to finish were Clark in a Brena, Durack in a Cadillac, Miller in a Mitchell, Hagerman in a Cadillac and Creech in a Buick.

The purpose of this race was to demonstrate the practicability of the Borderland route for transcontinental travel. The El Paso enthusiasts and those along the route wished to impress upon the motoring public that this is the only transcontinental route that is open the year round. It was a hard fought race from start to finish and was not won until the last hundred miles had been covered. A hundred miles from the finish it looked like an easy win for the Cadillac, but after having a lead of over an hour, Durack went into a hole and broke off his pet cock under the radiator. Not discovering his trouble he drove for mile after mile without water. The delay cost him the race. Newkirk had been driving consistently throughout and went into Bisbee, the first night control in fifth position. He kept a steady pace, speeding up only in the last 50 miles and won with time to spare. He used Miller tires and did not make a change in the entire race. The Velie was leading at Bisbee with the Stutz second and the Buick third. The first two finished well up but the Buick was ditched.

Nineteen cars started and eight finished. Fourteen went into the control at Bisbee. The winner averaged 33.3 miles per hour. It has been rumored that this race will be made an annual affair. It may be preceded next year by a race from Dallas to El Paso.

Ready for 500-Mile Reliability

NEW YORK CITY, Nov. 11—After several weeks of hard work formulating new stock car rules to govern its first road contest, the Motor Dealers' Contest Assn. of New York is now ready to go ahead with the promotion of its reliability run which is to be held on December 3, 4, and 5. The contest will be known as the 500-mile New York Reliability Run. On the first day the route will be over Long Island roads; the second day will lead into Westchester and Connecticut, and the third day the tour will be to Poughkeepsie and return. Each night of the run the contesting cars will be garaged in New York.

The new rules which were prepared by David Beecroft, George Robertson, and Emanuel Lacaris, have been approved by the Contest Board of the American Automobile Assn., and so well are they constructed that in all probability similar rules will be adopted to govern stock car events of the future. Under the rules all accessories on a car are taken into consideration and a penalty will be imposed for work done on accessories while on the road as well as defects in them which show at the end of the contest. This is the first contest in which rules of this kind have ever been used in America.

Gray & Davis at Paris Show

NEW YORK CITY, Nov. 11—There was a display of the Gray & Davis equipment at the Paris show last week, as shown in the accompanying illustrations. This system has been installed on some Charron cars, it is optional equipment on other French, and a few German cars, and a large order has been given by the Arrol-Johnston Co., Paisley, Scotland. Chas. Schmidt is the Gray & Davis Company's representative in Paris.

De Palma and Wishart at San Antonio

SAN ANTONIO, TEX., Nov. 10—A strong list of entrants has been obtained for the San Antonio automobile races November 20, 22 and 23. Louis Disbrow, driving his Simplex "Zip" and Ralph De Palma, with his Mercer, have entered the meet and will have an opportunity to race against each other in a track race for the first time in their racing careers. De Palma formerly piloted the Zip. Spencer Wishart, in a Mercer, will also appear.

In addition to the Case team, the racing committee of the San Antonio Auto Club, which is arranging the meet, announced that Monkmeier, driving a Stavers-Chicago, and Rickenbacker in a Mason, have been secured. Dr. W. A. Hering, president of the club, will act as starter, and Dr. Frederick J. Fielding as referee. The racing committee has practically completed its preliminary work, but will not draw the final card until later. R. T. Pruitt is chairman of the committee and R. W. Carr, advisor, representing the A. A. A.

30,000 See Phoenix Track Races

PHOENIX, ARIZ., Nov. 6—Thirty thousand people saw the track races here today, the feature being the 50-mile race for a purse of $2,000. Tetzlaff in a Fiat won, making the half century of circuits in 50:53 4-5. Oldfield with his Christie lowered the track record, first to 48 2-5 and later to 48 flat. Tetzlaff, in the Fiat cyclone, jumped to the front at the start and led to the finish. Magonne, in the Stutz, held second with the Mercer third. Oldfield, in the Renault, had engine trouble and lost many miles.

From the jump the time was fast, the first mile from a standing start being made in :58. The second mile was covered in :54. Tetzlaff made the first 5 miles in 4:38 and the 10 in 9:33 4-5. The 15 were left behind in 14:58 3-5 and the 20 in 20:00 1-5.

Magonne crept close to Tetzlaff on 20 but Ted let out his cyclone and opened up the hole to 1-16 mile. The Mercer was lapped in 22 but held on close for many miles.

Tetzlaff's time for 25 miles was 25:07 3-5 and for 30, 30:18 3-5. Tetzlaff was still leading at 35 miles in 35:25 and held steady to the fortieth in 40:29. The cyclone reached the 45 mark in 45:35 and finished with a lead of a half mile over the Stutz and a mile in front of the Mercer. Summary:

15-MILE RACE

Car	Driver	Time	Car	Driver
Simplex	Carlson	15:54⅗	Buick	Ellis
Marmon	Ball		Simplex	Newkirk

MILE TRIALS

Oldfield	Christie	48

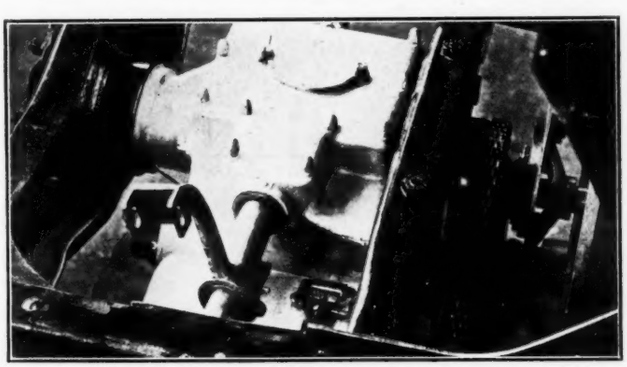
15-MILE ROAD RACE

Mercer	Buxton	16:50	Ford	Chonck
Buick	Nikrent			

FREE-FOR-ALL

Fiat	Tetzlaff	50:53⅘	Mercer	Nikrent
Stutz	Magonne			

Gray & Davis starter exhibited on Charron chassis at the Paris Salon. The starter is located between the crankcase arms



This illustration shows the Gray & Davis starter mounted at the side of the transmission. Drive is through a silent chain

EDISON Battery Plant Shut—More than 400 employees of the Edison Storage Battery Works in West Orange, N. J., were laid off last Saturday because of the scarcity of orders. Officials declared they hope to be able to take back those who were laid off in the course of 10 days or 2 weeks. Six-story concrete buildings, costing in the neighborhood of $250,000, will be completed in a few weeks, in which a new type of battery devised by T. A. Edison will be manufactured for use in automobiles only.

Panther Rubber Will Build—The Panther Rubber Mfg. Co., Sherbrooke, Que., will erect a factory there.

New Vancouver Plant—The Harry Sayers Rubber Co. will erect a big plant at South Vancouver, B. C. The firm will specialize in automobile tires.

Typhoon Moves Plant—The Typhoon Signal Co. has moved its offices and plant to Lincoln, Ill., where it now has 50,000 square feet of floor space.

Velie to Add—The Velie Motor Vehicle Co., Moline, Ill., plans to erect an addition to its plant which will afford 12,000 square feet additional floor space.

G. M. C. Foundry—A gray iron foundry is to be established by the General Motors Co. in the plant recently vacated by the Reliance Truck Co., Owosso, Ont.

Cadillac Plant in Cleveland—The Cadillac Motor Car Co., Detroit, Mich., it is said, will spend several hundred thousands of dollars in an assembly plant in Cleveland, O.

Body Manufacturer Building—The contract for the new four-story manufacturing building for the Alloway-Martin Co., Cleveland, O., which make automobile bodies, etc., has been awarded.

New Dayton Tire Plant—Roy Bickett, of the Dayton Auto Service Co., Dayton, O., is heading a movement to organize a company capitalized at $60,000 to manufacture automobile tires. The plan is to build a factory there.

May Establish Ford Plant—The Ford Motor Co., Detroit, Mich., it is said, is negotiating for the building which was recently occupied by the Rheinstrom Co., in the eastern portion of Ludlow, O., as an assembling plant for machines shipped south of the Ohio River.

New Homer Plant—The Homer Motors Co., Los Angeles, Cal., will erect a new factory on San Fernando road and Anvia street for the manufacture of motors, and for the construction of a heavy tractor and light delivery wagons. There will be a foundry for making all casting required for motors and trucks, complete machine shops, etc.

Aluminum Manufacturer Purchases Factory—The E. H. Feree Co., manufacturer of aluminum goods, Lockport, N. Y., has purchased the four-story factory formerly occupied by the Covert Motor Vehicle Works and the Harrison Radiator Co., and is equipping and moving into its new quarters.

The Automobile Calendar

Shows, Conventions, Etc.

Nov. 8-15	Atlanta, Ga., Show, Atlanta Automobile & Accessory Assn.
Nov. 17	Los Angeles, Cal., Auto Show.
Nov. 17-19	Boston, Mass., Electric Automobile Salon, Copley Plaza Ballroom.
Nov. 22-29	Providence, R. I., Show, State Armory.
Dec. 6-13	Toledo, O., Annual Show, Factories Bldg., Toledo Auto Shows Co.
Dec. 9-13	Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20	New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.
Jan. 2-10, 1914	New York City, Importers' Automobile Show, Hotel Astor.
Jan. 3-10, 1914	New York City, Automobile Show, Grand Central Palace.
Jan. 10-16	Milwaukee, Wis., Sixth Annual Show, Auditorium, Milwaukee Automobile Dealers' Assn.
Jan. 10-17	Cleveland, O., Automobile Show, Wigmore Coliseum, Cleveland Automobile Show Co.
Jan. 10-17	Philadelphia, Pa., Show, Metropolitan Building.
Jan. 12-17	Bridgeport, Conn., Annual Automobile Show, State Armory, B. B. Steiber, manager.
Jan. 17-24	Pittsburgh, Pa., Annual Automobile Show, Automobile Dealers' Assn.
Jan. 24-31	Montreal, Que., Automobile Show, Passenger Cars, Montreal Automobile Trade Assn.
Jan. 24-31, 1914	Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 26-31, 1914	Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.
Jan. 31-Feb. 7, 1914	Minneapolis, Minn., Automobile Show.
Feb.	Hartford, Conn., Show.
Feb.	St. Louis, Mo., Show.
Feb. 2-7	Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Assn.
Feb. 3-7	Montreal, Que., Motor Truck Show, Montreal Automobile Trade Assn.
Feb. 7-12	Seattle, Wash., Annual Automobile Show, State Armory Bldg., W. I. Fitzgerald, Manager.
Feb. 9-14	Buffalo, N. Y., Truck Show, Buffalo Automobile Dealers' Assn.
Feb. 16-21	Kansas City, Mo., Auto Show.
Feb. 21-28	Newark, N. J., Automobile Show, N. J., Auto Trade Assn.
Feb. 21-28	Cincinnati, O., Automobile Show, Cincinnati Automobile Dealers' Assn.
Feb. 23-28	Omaha, Neb., Automobile Show, Omaha Automobile Assn.
Mar. 2-6	Fort Dodge, Ia., Show, Fort Dodge Auto Dealers' Assn.
Mar. 7-14	Boston, Mass., Automobile Show.
Mar. 9-14	Des Moines, Ia., Show, Des Moines Automobile Dealers' Assn.
March 17-21	Boston, Mass., Truck Show.

Race Meets, Runs, Hill Climbs, Etc.

Nov. 20	San Antonio, Tex., Track Race, San Antonio Auto Club.
Nov. 27	Philadelphia, Pa., Lu Lu Temple Auto Club Run.
Dec. 3-5	New York City, 500-mile Reliability Run, Motor Dealers' Contest Assn.

McGraw Adds Four Elevators—The McGraw Tire & Rubber Co., East Palestine, O., recently placed an order with the Otis Elevator Co. for four high speed hydraulic elevators. The company is manufacturing 400 to 500 tires per day and the winter output is such that it is believed no further reduction in the working forces will be found necessary.

Mercury Cyclecar's Detroit Factory—W. J. Marshall and R. C. Albertus, whose cyclecar made its first appearance recently, have named the car the Mercury and the company, the Mercury Cycle Car Co. A lease was signed recently for the factory at 807 Scotten avenue, Detroit, Mich. This plant was occupied by the Tribune Motor Car Co., of which L. G. Hupp was the leader.

National Tire Will Build—Directors of the National Tire & Rubber Co., East Palestine, O., have let the contract for their new building to the Security Construction Co., Youngstown, O. The contract specifies that the building shall be completed and turned over to the company not later than January 15, 1914. The building will be 258 feet long by 46 feet wide, and two stories high.

New Veneer Factory—The Cookville Veneer Co., which has its main office at Cookville, Tenn., and which has been operating a plant for the manufacture of automobile spokes at Strongs, Miss., is preparing to install another plant at that point. The machinery has already been ordered and is now en route. The company has a large quantity of hickory timber in that immediate territory and this is being used chiefly for the manufacture of spokes.

Steel Plant for Indianapolis—Steel, especially adapted to the manufacture of motor cars, is to be manufactured in Indianapolis, Ind., by the newly organized Electric Steel Co., of Indiana. This will be the first steel manufacturing plant in the city and one of the few concerns manufacturing steel by means of electric furnaces in the United States. The new company has been incorporated with an authorized capital of $100,000 by G. A. Weidley, vice-president of the Premier Motor Mfg. Co., C. P. Wilson, H. McLandon, J. D. Forrest, and others.

Big Addition for Jeffery—Another big addition is to be made to the Jeffery works at Kenosha, Wis., which now covers 25 acres with 105 acres in which to expand. This building will contain approximately 2¼ acres of floor space and will be of standard sawtooth construction. It was started October 24 and will be ready for occupancy on December 5. The Jeffery company has doubled its output for 1914. Just 650,000 pounds of steel will be used in this structure. There will be something over 100,000 cubic feet of concrete work or masonry, with 14,000 square feet of window area. A force of 200 men is working on this structure. In order to avoid any possibility of being held up in the construction work the Jeffery company purchased raincoats for every workman on the job.

The Week in the Industry

Motor Men in New Roles

HOFFMAN with Haynes—R. C. Hoffman has been appointed chief draughtsman of the Haynes Automobile Co., Kokomo, Ind. Other appointments are: L. C. Burnett, the new district sales manager in the Northwest territory with headquarters in Minneapolis; F. A. Fisher becomes district sales manager in the same territory with headquarters at Toronto, Ont.; while J. S. Stark will henceforth represent the Haynes in the Hoosier State with headquarters at Elkhart.

Hawks Resigns—J. R. Hawks has resigned his position as manager of the Motor Car Co., of New England, Boston, Mass.

Drecktrade with Holt-Chandler—F. W. Drecktrade has been made vice-president of the Holt-Chandler Co., 1808 Broadway, New York City.

Foster with Stewart—W. J. Foster has taken charge of the used car department of the Stewart Automobile Co., 231 West Fifty-fourth street, New York City.

Page with C. T. Silver—A. W. Page, formerly of the Packard Motor Car Co. has assumed charge of the used car department of the C. T. Silver Motor Co., New York City.

Rice Resigns—D. E. Rice has resigned as sales manager of the Schoen-Jackson Co., Media, Pa., and for the present will be connected with the Atwater Kent Mfg. Co., Philadelphia, Pa.

Tuttle Goes West—Harry Tuttle, special representative of the Lyons-Atlas Co., Indianapolis, Ind., has gone to the Pacific Coast to establish the Lyons-Knight cars in the far West.

Peabody Goes West—F. H. Peabody, for 8 years assistant to C. E. Fay, of the Boston branch of the Ford Motor Car Co., has been promoted to be manager of the Ford branch at Louisville, Ky.

Forbes Leaves Palmer-Singer—Kingstone Forbes having completed the design of the Palmer-Singer 1914 models has left that company. He will not at present publish his plans for the future.

Wellman in New Field—Fred Wellman, formerly automobile editor of the *Indianapolis News*, has become director of publicity for the Indianapolis Motor Speedway. He succeeds Paul R. Martin.

Rhamstine New Washington Manager—J. Thomas Rhamstine, for a number of years connected with a prominent garage in Washington, D. C., is now acting manager of the Motor Service Co., that city.

Nehrbas Factory Manager—F. P. Nehrbas has been appointed factory manager of the Lyons-Atlas Co., Indianapolis, Ind. He designed the Thomas car that won the New York-to-Paris race several years ago.

Waldon Off for Europe—S. D. Waldon, vice-president of the Packard Motor Car Co., Detroit, Mich., left recently for Europe to study the trend of design among foreign builders of cars. He is accompanied by M. J. Budlong.

Will Handle Used Cars—F. D. Palmer and L. E. Schwartz have gone into partnership to handle used cars. They have incorporated as the Automobile Dealers' Outlet Co., with offices at 110 West Sixty-third street, New York City.

Kline Superintendent after Agencies—M. M. Pharo, general superintendent of the Kline Motor Car Corp., Richmond, Va., has left for an extensive trip through the South, with a Kline 6-50, for the purpose of appointing agents.

Brown Indianapolis Sales Manager—Will H. Brown has been appointed sales manager of the Indianapolis sales branch of the Cole Motor Car Co. He will continue his connection with the Brown Commercial Car Co., Peru, Ind.

Moreland with Anderson—H. E. Moreland, secretary of the C. M. Green Co., Detroit, Mich., has severed his connection with the company to become special representative of the Anderson Electric Car Co., of that city, with headquarters at Chicago, Ill.

Adams Joins Detroit Co.—Melvin J. Adams has joined forces in Detroit, Mich., with the Carl M. Green Co., which handles the advertising of the Chalmers, General Motors Truck, Detroit Electric and other concerns, both in and out of the automobile industry.

Weigold Detroit Cyclecar Engineer—Ernest Weigold, for 6 years chief engineer of the Herreshoff Motor Co., and previous to that engineer with the E. R. Thomas Motor Co., has become associated with the Detroit Cyclecar Co., Detroit, Mich., as chief engineer.

Former Rayfield Sales Manager Dies—The Findeiser & Kropf Mfg. Co., Chicago, Ill., received advices recently from Paris, France, conveying the sad news of the death of N. H. Miniter, former sales manager of the Rayfield Co., who had resigned his position to go to Europe in search of health.

Jean Richard Reaches America—Jean Richard, son of Georges Richard, the automobile manufacturer of France, has reached America and will go to work for one of the big automobile manufacturers of Detroit, to learn American manufacturing methods. He recently graduated from the Ecolle Centralle of Paris.

Garage and Dealers' Field

Braender Agency Moves—The Braender Rubber & Tire Co. has moved its stock to 1987 Broadway, New York City.

Portland Wants Municipal Garage—The City of Portland, Ore., is considering the purchase of machinery for a municipal garage.

Russell Co.'s New Quarters—The W. L. Russell Co., distributor of Haynes and Regal cars, has taken possession of its new salesrooms in the Motor Mart, Park Square, Boston, Mass.

Lenox Makes a Move—The Boston, Mass., branch of the Lenox Motor Car Co., has been moved from the Motor Mart in Park Square to 1118 Boylston street.

New Baltimore Supply House—The City Auto Supply House, Baltimore, Md., has opened its local headquarters at 214 West Franklin street. Harry A. Mayer is manager.

Franklin Wins Medal—At the North Carolina State Fair held in Raleigh, N. C., recently the new Franklin Six-30 won the first premium gold medal. The prize was based on appearance, efficiency, ability and value for price.

Grade Crossing Abolished—The Tower Grove grade crossing, St. Louis, Mo., long the subject of legal tangles, will at last be abolished. Saturday Mayor Henry Keil drove a spade into the ground, breaking the site for a viaduct.

New Bainbridge Garage—The Caldwell Motor Car Co., Bainbridge, Ga., is erecting a two-story fireproof garage and repair shop, each floor being 60 by 80 feet. This building will be in the rear and adjoining its present two-story building occupied as salesroom.

Stewart-Warner's Nine Branches—Nine new direct factory branches have been opened by the Stewart-Warner Speedometer Corp., Chicago, Ill., in Philadelphia, Pa., Pittsburgh, Pa., Atlanta, Ga., Portland, Ore., Los Angeles, Cal., Kansas City, Mo., Minneapolis, Minn., Cincinnati, O., and St. Louis, Mo.

Sells Vulcanizing Business—C. C. Marble has sold his tire and vulcanizing business in Indianapolis, Ind., to the Culbertson Rubber Tire and Vulcanizing Works. The Indianapolis sales branch of the Rauch & Lang Electric Auto Co. has been moved from 531 North Capitol avenue to 3011 Central avenue, in the North Side Garage.

Is Now Cuyahoga Sales Co.—The Lozier Sales Co., Cleveland, O., formerly selling agents of the Lozier and Chandler cars, has been reorganized by the same interests, but under the name of the Cuyahoga Sales Co. Ray M. Colwell continues as manager and the efforts of the new organization will be devoted to the distribution of Chandler light six cars in Ohio.

Boston's New Taxicab Co.—A new taxicab company, it is said, is about to be organized by a group of Boston business men under the management of E. M. Osgood, who has come from Buffalo, N. Y., to formulate the preliminary plans. The new company is negotiating with Gray & Davis, Inc., for the rental of the premises recently occupied by that company on Lansdowne street.

New Overland Home—The Connell & McCone Co., of Boston, Mass., agent for the Overland in that city, has just moved into a new building on Massachusetts avenue between Boylston street and Huntington avenue. It gives the company much more room than it had on Boylston street. The company is building a four-story service station on West Newton street that will be finished soon.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

AKRON, O.—Tanner-Hower Mfg. Co.; capital, $50,000; to manufacture and sell automobile and motorcycle parts and other kinds of machinery parts. Incorporators: Perry B. Tanner, M. Otis Hower, William T. Helfer, John Claude Stafford, John Johnsen.

BOSTON, MASS.—Colonial Sightseeing Auto Co.; capital, $5,000. Incorporators: Burton L. Thomas, Abraham S. Caplan, Joseph P. Hayes.

BOSTON, MASS.—Franklin Motor Car Co.; capital, $10,000. Incorporators: Otto A. Lawton, Harold D. Cuchman.

BROOKLYN, N. Y.—N. W. Mfg. Co.; capital, $25,000; to manufacture auto body and engine cleansers, etc. Incorporators: Chas. E. Williamson, Chas. E. Smith, Lucian C. Wallace.

BROOKLYN, N. Y.—Pitts Motor Car Repair & Sales Corp.; capital, $24,000. Incorporators: Frank G. Pitts, George O. Walbridge, Rodney O. Walbridge.

BUFFALO, N. Y.—F. H. Chace Co.; capital, $5,000; to do a general automobile business. Incorporators: Frank H. Chace, Daniel Walker, Henry A. Thayer.

BUFFALO, N. Y.—Frontier Taxicab & Touring Car Co.; capital, $5,000. Incorporators: Frank Conover, Anthony Carnevale, Samuel Giddis, Charles W. Bates, Charles Krier, Philip Miller, Emil Ramsdorf, Fred Mugridge.

CHICAGO, ILL.—Triple Action Spring Co.; capital, $25,000; to manufacture and deal in springs, mechanical appliances, automobiles, accessories, etc. Incorporators: Oliver G. Temme, Richard H. Mather, Claude B. Church.

CHICAGO, ILL.—Williams Self-Starter Mfg. Co.; capital, $5,000; to manufacture and deal in autos, parts, patents and accessories, motors, etc. Incorporators: Edwin Williams, David P. King, Johan B. Rosen.

CLEVELAND, O.—Central Wagon & Auto Co.; capital, $10,000; to buy and sell wagons, automobiles and other vehicles. Incorporators: Steve Cordas, H. D. Squires, Harvey G. Keck, M. T. Gardner, R. O. Carver.

CLEVELAND, O.—Cleveland Rotary Motor Co.; capital, $1,000; to deal in rotary motors. Incorporators: Paul Schwan, Jr., C. W. Neubrand, K. L. Mach, A. T. Daniels, J. L. Bird.

CLEVELAND, O.—Kemco Electric Mfg. Co.; capital, $100,000; to buy, sell, manufacture and deal in electric supplies and parts of automobiles. Incorporators: Wallace Knight, C. G. Rhoades, Herbert Matthews, D. F. Howe, Lyman D. Bothwell, Jr.

DALLAS, TEX.—Adolphus Auto Rent Co.; capital, $15,000. Incorporators: T. B. Bower, C. L. Bower, T. A. Pitman.

DAYTON, O.—Public Motor Car Co.; capital, $10,000; to buy and sell motor cars of all kinds. H. H. Williamson, R. J. Williamson, G. Ed. Borth, Brice Welch, M. Kewen.

DETROIT, MICH.—American Motor Truck Co.; capital, $10,000. Incorporators: A. H. Reinhold, W. K. Ackerman, John D. MacKay.

DETROIT, MICH.—Sterling-Detroit Motor Co.; capital, $3,100. Incorporators: H. Little, E. Finkenstedt, Robert Dittenhaver.

GREENVILLE, ILL.—Auto Supply & Sales Co.; capital, $2,500. Incorporators: Ed. Demoulin, Elvy W. Miller, Clarence E. Hoiles.

LAWRENCE, MASS.—Archibald Wheel Co.; capital, $800,000; to manufacture vehicle wheels. Incorporators: F. M. Andrew, E. H. Archibald, I. M. Archibald.

LOUISVILLE, KY.—Flannelly-Clarkson Auto Co.; capital, $2,250. Incorporators: Charles Clarkson, E. J. Clarkson, T. R. Flannelly, M. H. Flannelly.

MILWAUKEE, WIS.—Fulton Co.; capital, $15,000; to deal in motor car supplies and accessories. Incorporators: Frank L. McNamara, Roher Y. Flangers, John H. Hurley.

MILWAUKEE, WIS.—Robinson Auto Heater Co.; capital, $25,000; to manufacture heating devices for automobiles. Incorporators: J. K. Robinson, E. W. Robinson, H. L. Kellogg.

MILWAUKEE, WIS.—Western Motor Supply Co.; capital, $25,000; to manufacture and deal in motor car accessories and supplies.

NEWARK, N. J.—Essex Motors Mfg. Co.; capital, $100,000; to manufacture motors, machinery, supplies, etc. Incorporators: Wm. H. Simpson, Norton E. Huddeu, John J. Coyle.

NEW YORK, N. Y.—Auto-Ped Co.; capital, $1,000,000; to manufacture, sell and deal in and with cars, carriages, boats and motor vehicles of all kinds. Incorporators: Jos. F. Curtin, Clarence E. Eaton.

NEW YORK, N. Y.—Detroiter Motor Sales Co. of N. Y.; capital, $5,000; to do a general automobile business. Incorporators: Chas. Aschenbach, Joseph Marx, Leon Hamburger.

NEW YORK, N. Y.—E. H. Garcin & Co.; capital, $25,000; to deal in asbestos and rubber goods. Incorporators: Ed. H. Garcin, Geo. E. Richards, Geo. S. Fulton.

NEW YORK, N. Y.—Hirsch & Schwartz; capital, $10,000; autos, livery, garage. Incorporators: Joseph Schwartz, Louis Hirsch, Jacob Schwartz.

PARKERSBURG, W. VA.—Market Garage; capital, $25,000; to deal in automobiles and supplies. Incorporators: E. M. Norma, V. McCoy, D. Strader, Carrie R. Strader, J. H. Knapp, Florrie Knapp.

PERKIOMEN, PA.—Oakbrook Motor Mfg. Co.; capital, $250,000; to manufacture and deal in motor vehicles.

PHILADELPHIA, PA.—Albertson Co.; capital, $25,000; to manufacture, sell and deal in all kinds of motor vehicles. Incorporators: F. R. Hansell, Geo. H. B. Martin.

RACINE, WIS.—Lewis Motor Co.; capital, $250,000; to manufacture motor vehicles. Incorporators: Wm. Mitchell Lewis, E. B. Hand, Rene W. Petard.

RICHMOND VA.—American Auto Sales Corp.; capital, $10,000. Incorporators: L. C. Williams, F. C. Neister.

ROCHESTER, N. Y.—Indian Taxicab Co.; capital, $5,000. Incorporators: Wm. S. Lucas, Harry F. Lucas, Anna B. Lucas.

WAPAKONETA, O.—Breese Motor Plow Co.; capital, $100,000; to manufacture and deal in machinery, tools and implements and other motor driven vehicles. Incorporators: Robert A. Breese, G. R. Morris, David Lorbach, S. B. Everett, J. A. Hartford.

WHITE PLAINS, N. Y.—W. L. Plumb Motor Co.; capital, $1,000; automobile business and machine shop. Incorporators: Walter L. Plumb, C. B Plumb, S. Alton Ralph.

WICHITA, KAN.—Jones Auto Exchange Co.; capital, $100,000. Incorporators: J. J. Jones, Laura Neal Jones, A. J. Coombs, C. H. Reser, F. C. Adams.

WINCHESTER, MASS.—Mystic Valley Garage; capital, $25,000; automobiles. Incorporators: G. Goddie, N. Goddu, R. W. Burnes.

GARAGES AND ACCESSORIES

BOSTON, MASS.—Parker Carbureter Co.; capital, $250,000. Incorporators: George E. Parker, Kenneth F. Parker, John T. Clark.

CLEVELAND, O.—DeForrest Electric Welding Co.; capital, $5,000; electric welding. Incorporator: R J. Lamb.

MILWAUKEE, WIS.—Wisconsin State Rubber Co.; capital, $10,000; to establish a general rubber goods business and handle tires and accessories. Incorporators: Harold D. Detienne, Mrs. Wallis Mrs. Detienne.

MUSKOGEE, OKLA.—Motor Gasoline Co.; capital, $25,000. Incorporators: J. M. Givens, E. E D'Yarmett, W. E. D'Yarmett.

NEW YORK, N. Y.—Leather Tire Goods Co.; capital, $7,000; to deal in auto specialties, tires, etc Incorporators: Hans Gurlitt, Dodge Loebmann William Loebmann.

NEW YORK, N. Y.—Modern Garage Co.; capital $10,000. Incorporators: Thomas Black, Henry W Biggs, Carl S. Flanders.

PITTSBURG, PA.—Artillery Automobile Tire Protector Co.; capital, $100,000; to manufacture, sell and deal in automobile tires. Incorporators: John C. Willington, H. C. May, Geo. A. Pestel, A. J Coppock, Clarence J. Jacobs.

ST. JOSEPH, MO.—Grand Central Motor Car Co.; capital, $15,000; to equip an automobile repair shop and garage. Incorporators: W. J. Hendler, H. R Lewis, Louis Segel.

WASHINGTON, D. C.—Miller's Inner Tire Core Co.; capital, $250,000; to manufacture inner tire cores.

CHANGES OF NAME AND CAPITAL

CHICAGO, ILL.—Diebler Motor Car Co.; change of name to Sturdy Mfg. Co.

HOUSTON, TEX.—Overland Automobile Co. change of name to Sprong-Roberts Automobile Co

CINCINNATI, O.—Nyberg Auto Sales Co.; change of name to Queen City Garage & Repair Co.

BARBERTON, O.—Summit Rubber Co.; capital increased from $50,000 to $100,000.

CINCINNATI, O.—Nyberg Auto Sales Co.; decrease of capital from $25,000 to $7,500.

MILWAUKEE, WIS.—Feilbach Motor Co.; capital increased from $50,000 to $100,000.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Altoona, Pa.	Oakland	Mountain City Motor Co.
Ashland, Ky.	Marion	Wright Motor Car Co.
Bartlesville, Okla.	Oakland	S. C. Brady.
Bentonville, Ind.	Oakland	Ray Thornberg.
Brookfield, Mo.	Partin-Palmer	G. F. Evans.
Buffalo, N. Y.	Partin-Palmer	Louis Engel, Jr.
Centralia, Ill.	Partin-Palmer	Centralia Gar. & Vul. Co.
Charleston, Ill.	Oakland	Thos. Pendergast.
Charlotte, N. C.	Marion	United Motor Charlotte Co.
Dallas, Tex.	Marion	Sacksteder-Potter Co.
Decatur, Ill.	Marion	F. D. Parker.
Elgin, Tex.	Partin-Palmer	John M. Puckett.
Ely, Nev.	Cole	Ely Garage & Supply Co.
Forest Grove, Ore.	Cole	J. J. Wirtz & L. H. Watkins.
Gardner, Ill.	Partin-Palmer	Wagner & Root.
German Valley, Ill.	Partin-Palmer	F. R. Aukes.
Gillett, O.	Partin-Palmer	Nicholas Stromer.
Hampton, Ia.	Marion	Roemer-Gibson Co.
Herculaneum, Mo.	Metz	Dugan Lub. Co.
Indianapolis, Ind.	Partin-Palmer	Partin-Palmer Motor Car Co.
Jacksonville, Ill.	Partin-Palmer	David Estaque.
Kewaunee, Wis.	Maxwell	Haney-Pastor Co.
La Grange, Mo.	Metz	Crouch & Moat.
Lima, O.	Partin-Palmer	C. H. Shappell.
Logansport, Ind.	Oakland	Oakland Sales Co.
Maple Park, Ill.	Partin-Palmer	A. A. Marvin & Co.
Marlboro, Mass.	Cole	F. S. Dewey, Jr.
McNabb, Ill.	Partin-Palmer	George Ziegler.
Medford, Ore.	Cole	C. E. Gates.
Miami, Fla.	Oakland	J. K. Dorn.
Neenah, Wis.	Cole	C. H. Bergstrom.
Newman, Cal.	Oakland	J. L. Kinnear.
Ohio, Ill.	Partin-Palmer	Alfred Johnson & Son.
Omaha, Neb.	Partin-Palmer	Traynor Auto Co.
Parnell, Mo.	Partin-Palmer	Roof & Gray Auto Co.
Phillipsburg, N. J.	Oakland	Geo. W. Kiefer.
Pitman, N. J.	Partin-Palmer	Fenton L. Sayre.
Pittsburg, Kan.	Cole	W. T. Embree.
Reedsville, Wis.	Partin-Palmer	Piepenburg & Reichert.
Richland Center, Wis.	Maxwell	Leslie James.
Saginaw, Mich.	Oakland	G. E. Seeley Co.
Salem, Mo.	Metz	W. M. Pelton.
Salem, Ore.	Cole	Chamberlin Bros.
Taylorville, Ill.	Partin-Palmer	H. E. Richmond.
Tiffin, O.	Partin-Palmer	Wingert & Miller.
Upper Alton, Ill.	Haynes	O. Reausseau.
Victoria, Tex.	Cole	E. E. Pickering.
Viola, Wis.	Partin-Palmer	Martin Bros.
Warren, Pa.	Cole	F. W. Douglas.
Warsaw, Ill.	Partin-Palmer	M. C. Eckbohm.
Washington, D. C.	Marion	Cunningham Motor Co
Youngwood, Pa.	Partin-Palmer	Wallace & Keffer.

COMMERCIAL VEHICLES

Abilene, Tex.	Chase	W. H. Childers.
Beaver Lick, Ky.	Chase	Robert Littrell.
Cameron, Tex.	Chase	J. B. Cavitt.
Denison, Tex.	Chase	R. L. Aspley.
Ferris, Tex.	Chase	L. W. Jones.
Gainesville, Tex.	Chase	W. L. Greenhill.
Hillsboro, Tex.	Chase	Hillsboro Garage.
Irving, Tex.	Chase	C. L. Littlepage.
Jackson, Miss.	Chase	W. H. Allen.
Kaufman, Tex.	Chase	G. C. Smith.
Liam, Peru.	Chase	Graham Howe & Co.
Marlin, Tex.	Chase	McClelland & Philips.
Olney, Tex.	Chase	W. W. Benson.
Savannah, Ga.	Chase	Fred. E. Harr & Son.
Waco, Tex.	Chase	J. Morgan Automobile Co.

Hartford Starter Is Fitted With Flywheel

Drives Through Friction Clutch and Double Gear Reduction

INSTEAD of relying only on a high starting torque in the motor the Hartford electric starting system makes use of the energy stored up in a flywheel which is first speeded up and then applied to the crankshaft through suitable gears. In this respect the system differs from others. The chief advantage claimed for it is the use of a smaller motor, requiring less current.

The general appearance of the starting unit, including the gear-case containing the first step of reduction through a worm is shown in Fig. 2. It will be noticed that a flywheel is situated between the motor and the gear. This flywheel contains a friction clutch which is normally held out of action by a spring. Means for bringing the faces of the clutch together are provided. Drive from the worm-wheel shaft to the crankshaft is by chain.

When starting an engine the following action takes place: First, a switch is closed by a pedal on the footboard, starting the motor, which being free immediately runs up to an exceedingly high speed. Further movement on the same pedal causes the clutch to come into operation. This is arranged to take place suddenly with the result that a high starting torque, obtained from the momentum of the spinning flywheel is applied to the crankshaft.

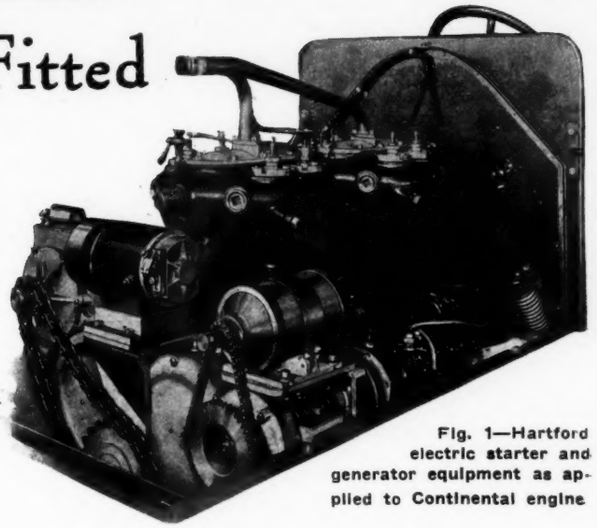


Fig. 1—Hartford electric starter and generator equipment as applied to Continental engine

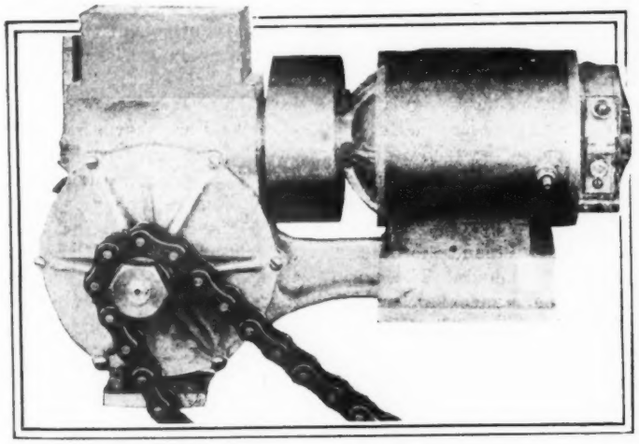


Fig. 2—Motor and gear case of Hartford electric starter

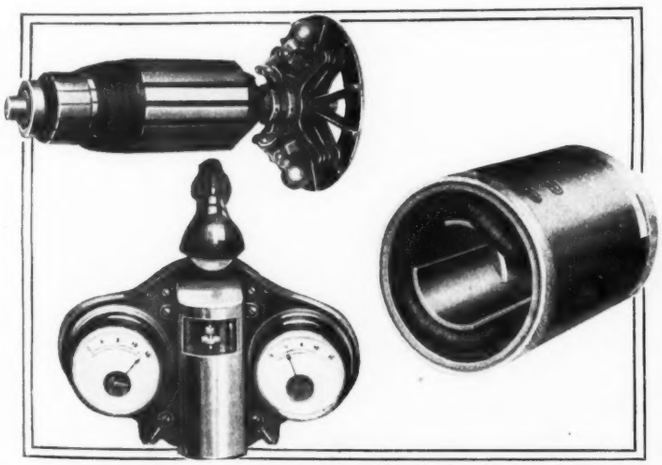


Fig. 3—Magnet casing and armature with centrifugal governor of Hartford electric generator. Below, cut-out and dash instruments

One method of fitting the Hartford starting motor is shown in Fig. 1. It is also made for attachment to the crankshaft in front of the radiator and in various positions on the transmission or engine flywheel. The view shown also illustrates the fitting of the generator of the complete Hartford system, above the pump or magneto shaft.

The upper view in Fig. 4 shows the operation of the starting motor, the drive of which is taken through the clutch within the flywheel F. A steel disk D is keyed by a sliding key to the worm shaft W, and is arranged so that normally it occupies a free position out of contact with any part of the flywheel. The operating rod R for the clutch passes through the center of the worm shaft and is connected through a lever to a plunger on the switch S mounted above the gear case. On this operating rod being moved to the left the clutch disk is pulled into contact with the rotating surface of the flywheel which is covered with raybestos and transmits the drive. A thrust ball bearing is fitted to the end of the rod to prevent friction and a spring surrounding the rod forces the clutch disk out of action as soon as the pedal is released.

High Drive-Ratio Used

The flywheel weighs 5 pounds and the drive ratio between the worm and the intermediate shaft is about 25 to 1. Since the reduction from this shaft to the crankshaft by chain is about 3 to 1 it follows that the total reduction of the starting system from the motor to the crankshaft is about 75 to 1. This is an unusually high ratio for this purpose and points to the high speed characteristic of the motor. An over-running clutch is fitted in the chain wheel on the crankshaft to prevent driving in the reverse direction. This clutch runs in a ball bearing.

An interesting chart showing the characteristics of the Hartford starting motor with flywheel attached is shown in Fig. 5. It will be seen that immediately on connecting up, about 180 amperes are drawn from the battery, but that this drops rapidly as the speed increases, until, when running free, the motor attains the high speed of nearly 9,000 revolutions per minute, by which time the amperage has fallen to about 20. This current rises again as soon as the clutch is put into operation, and the motor meets the resistance of the engine crankshaft.

In wiring up, the motor leads are simply taken from the two terminals to the batteries, the starting switch being the only insertion in the circuit. This is shown in the diagram of connections, Fig. 6, in which the thickest lines indicate the motor leads.

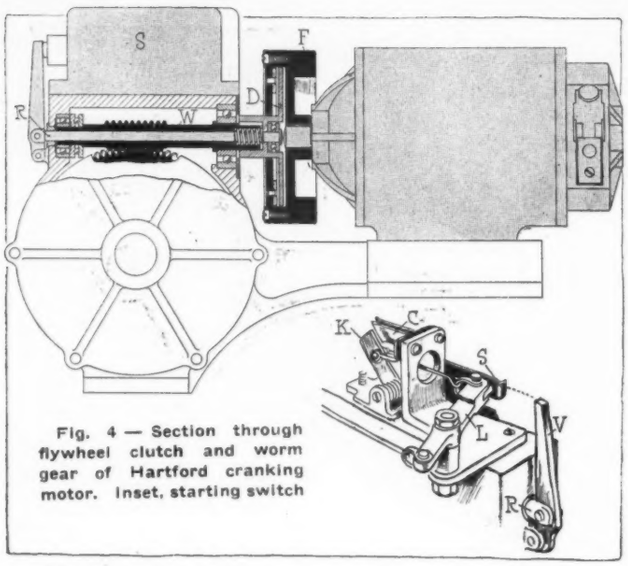


Fig. 4 — Section through flywheel clutch and worm gear of Hartford cranking motor. Inset, starting switch

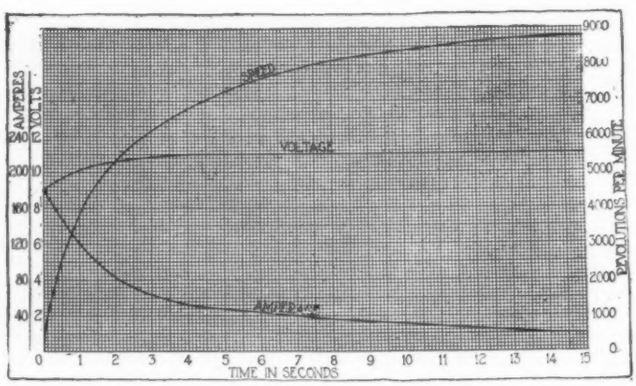


Fig. 5—Curves obtained from test of Hartford starting motor

This switch is of the knife blade type as shown in the lower sketch Fig. 4, in which C are the contacts and K the knife blade. Operation of the switch is by the lever L which is connected at one end to a pedal on the foot-board by a suitable system of levers or cable and at the other through a short link to the switch blade. When the outer end of the lever L is moved so that the switch blade goes into the contact pieces the other end passes along a piece of spring steel S which is bent so as to cause a momentary halt followed by a sudden release when the lever passes the end of the spring. The lever then strikes a vertical lever V which transmits a strong pull on the clutch operating rod R situated below and so connects the motor to the starting gear as described above.

The diagram of wiring, Fig. 6, shows the complete starting and lighting system. The generator is connected to the two outside terminals of the battery through a cutout provided with voltage and series windings. This cut out is of the ordinary type except that the plunger operates in a vertical position with the platinum contacts situated above. Besides its weight the plunger is provided with a spring which insures an opening of the contacts when the current from the generator is insufficient to charge the battery. The fine or voltage winding of this cutout is connected permanently across the generator terminals as shown, and when the car is running at a speed of 8 miles per hour enough current is being generated to actuate the plunger, bringing the contacts together and permitting the full current to flow from the generator to the battery and the outer circuit

The cutout is mounted on a small instrument board with an ammeter and voltmeter on either side for placing on the dash, Fig. 3. The cover over the cutout in the center is provided with a transparent inspection door over the contact point so that their condition can be easily examined.

12-Volt Battery System Used

It will be noticed from the battery shown in Fig. 6 that the Hartford system belongs to the 12-volt order. The lighting wires being taken off on the third-wire principle. Although the 6-volt system is more common the 12-volt system can claim some advantages. Of these, the most important are, that lighter wiring and windings on the generator and motor can be used.

Constructionally, the generator follows much on the lines of the motor, having a similar cylindrical magnet casing with two poles. The armature and casing disassembled are shown in Fig. 3. The upper view shows the attachment of the centrifugal governor to the end of the armature shaft, and also the two friction disks which hold the speed at 1,200 revolutions per minute.

Two sizes of starting motor are made, one of these being 5.2 inches diameter and the other 4.125. The weight of the larger model is 23 pounds. The worm gear and casing, together with driving chain and chain wheel fitted to the crankshaft weigh about 50 pounds so that the total weight of the large motor starting equipment is about 73 pounds. With the small motor, the equipment complete weighs about 56 pounds. A sixty ampere-hour battery is used in the larger set and a 35-ampere-hour battery for the smaller.

The lighting switch is of the selective barrel type with three positions of the handle as follows: 1—Head and tail lamps; 2—Side and tail; 3—Head, side and tail.

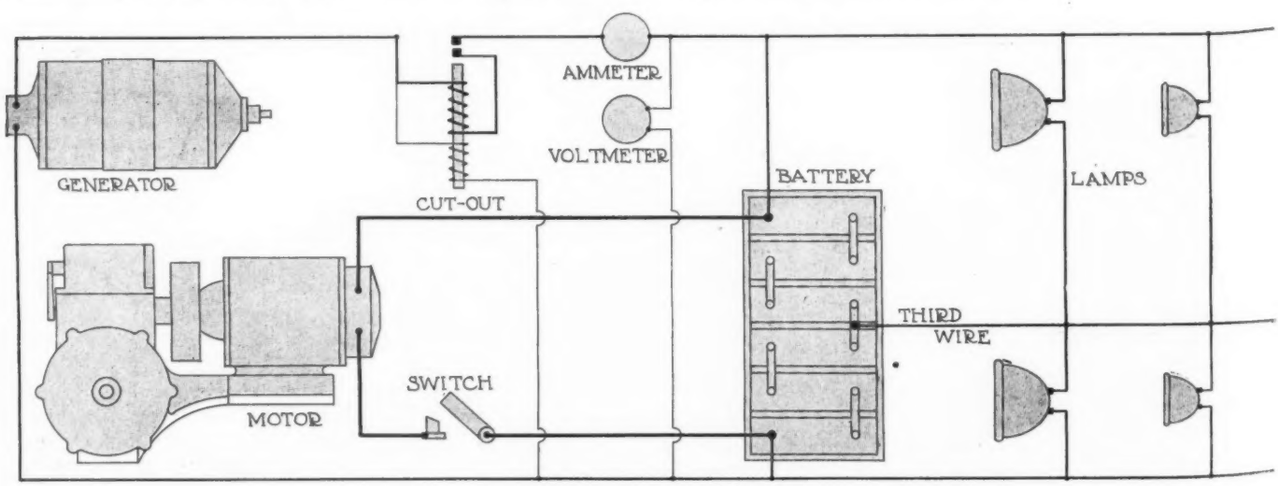


Fig. 6—Diagram of connections of Hartford 12-volt lighting and starting system

Accessories for the Automobilist

STANWELD Demountable Rim—A demountable rim of entirely new design is the latest product of the Standard Welding Co., Cleveland, O. The maker claims that while this rim is very little heavier than the ordinary clincher type, it is very strong, is moisture proof, will not cut nor chafe the tire casing and that a tire may be removed with ease, even when it is badly rusted on the rim.

The rim, Figs. 1 to 3, consists of five principal parts: the felloe band A, which is shrunk permanently on the wheel; the collapsible inner band B, which is held in place by a toggle C and which is grooved to hold the endless side rings or flanges D; the wedge ring which centers and holds the inner band on the wheel; and the demounting mechanism which consists of six clamps operating on six bolts extending through the wooden felloe and support the felloe band at the rear. The center of the collapsible inner band is raised to provide a perfectly flat seat for the tire. The inner band is split near the valve stem and each end is provided with a portion of a toggle lock which is opened with an ordinary screw driver and closed by the pressure of the foot. The side flanges are made in two styles, for both straight side and clincher tires. Fig. 3 shows the method of removing a tube without taking the side rings off.

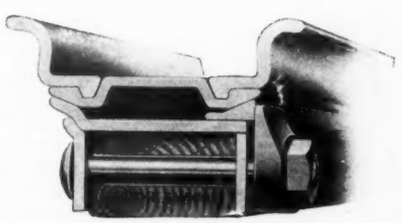
Warm Hand Wheel—Gloves that are heavy enough to keep the hands warm make for clumsiness in driving, and then there is always the danger of losing control of the car when the hands become numb. These difficulties have been overcome by the device shown in Fig. 4, which is a steering wheel with electrically heated grips. The heat from the grips being sufficient to keep the hands warm in the coldest weather even when kid gloves are worn. The wheel is slightly countersunk in the two places where the heater is installed so as to allow the tubing forming the heater to be wound flush with the balance of the rim. This not only keeps the hands warm and makes a very neat appearance, but furnishes an exceptionally good grip for the driver. In the tubing is a heavily insulated wire, one end of which runs to the current source and the other is grounded on one of the spider arms. The necessary electric energy may be obtained from a storage battery, lighting generator, or, in the case of Ford cars, may be operated from the magneto without interfering with the ignition. The heat is turned on by removing the plug from the socket A and putting it in the socket B. The Warm Hand Wheel is installed on a Ford or any machine where the rim is screwed onto the spider by simply removing the four screws holding the old rim and putting on the new. On machines where the rim is integral with the spokes the whole wheel is furnished. The price of this device for Fords is $10, for other machines where only the rim is replaced $20 and where a new wheel is furnished $25. The Warm Hand Steering Wheel Corp., Poughkeepsie, N. Y., is the maker.

Fig. 4—Warm hand wheel, showing electrically heated grips on rim. The current is turned on by moving the plug from A to B

Lufkin Rule—Every one, having use for a rule graduated to sixty-fourths of an inch, knows how hard it is to read the graduations quickly, due to their fineness and nearness together. Also because the lines are so close to each other it is impossible to number them all and therefore, after arriving at a measurement, it is necessary to refer back to the last figure and count up the sixty-fourths. These difficulties are overcome in the new Allen Improved Scale, a patented article, made by the Lufkin Rule Co., Saginaw, Mich. The four edges of the scale are divided up as follows: one edge has all the divisions indicating the sixteenths of an inch, 1, 2, 3, etc., and the other edge on the same side has the divisions for the thirty-seconds. On the other side of the rule one edge has divisions marked one-sixty-fourth, five-sixty-fourths and on up by intervals of one-sixteenth-inch and the other edge has the lines indicating three-sixty-fourths, seven-sixty-fourths inch. The rule is three-fourths-inch wide, and is furnished in two thicknesses, commonly known as the tempered and semi-flexible. It is made in various lengths, including the common six-inch size.

Whitmore Greases—The Whitmore Mfg. Co., Cleveland, O., is turning out special lubricants for every part of an automobile, excepting the motor. These greases are styled Whitmore's Auto Gear Protective Composition for gearcase, differential, or whatever other part the lubricant is especially for. Practically perpetual lubrication is claimed for these greases, as it is only necessary to fill gearcase, differential case or bearing once every year or two, the maker states. Gears are made almost noiseless, and their wearing qualities largely increased by the use of these lubricating materials, according to the maker. Compositions are also made for roller and silent chains, springs and worm gears.

Sharrer One-Hand Top—A top built along interesting lines is manufactured by the Sharrer Patent Top Co., New York, N. Y. It is capable of being raised or lowered in a few seconds by one hand, due to the fact that no bows or sockets are attached to the front



Figs. 1, 2, 3—Left, illustration shows method of opening toggle. Center, cross-section through rim. Right, shows removal of inner band; tube may then be removed without taking off side rings

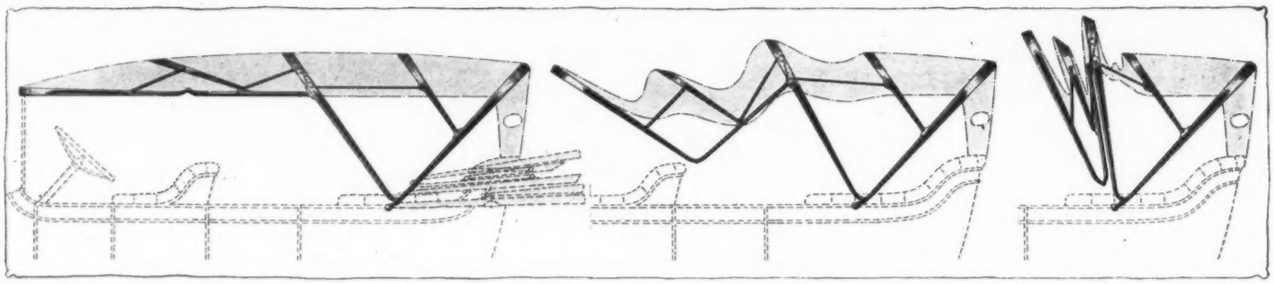


Fig. 5—Sharrer one-hand top, showing the method of putting the top up. The top is held in position, when up, by two cables. Straps fasten the front firmly to the dash or cowl

seat, the top being supported entirely from the rear. Straps, Fig. 5, run from the front corners of the top to their fastenings on the cowl or dash to supply the rigidity that would otherwise be lacking with a construction of this type. The load imposed by these straps, considering the top as a cantilever beam, fastened at the rear, is carried by cables concealed in the top covering. Coverings of mohair, cravenette, and Pantasote may be had while Jiffy or Collins curtains with celluloid windows are furnished.

Inter-Leaf Self-Lubricating Springs—A method of continuous and automatic spring lubrication, that is simple but satisfactory in operation, has been devised and patents applied for by the Detroit Steel Products Co., Detroit, Mich. Fig. 6 shows the construction of this device. Small cups or depressions are formed near the ends of the leaves and these are filled with a heavy grease or graphite. The motion of the different members of the spring upon each other serves to spread the lubricant evenly over the surfaces, the points at which the greatest relative movement occurs receiving the largest amount of grease. The section through A-B shows the concave form of the leaves, each leaf being an individual channel for the lubricant. The manufacturers have found, after exhaustive tests, that one filling every 6 months is sufficient to secure good lubrication. Filling the grease cups is readily accomplished by prying the springs apart with a screwdriver.

No-Air Cores—The Akron Airless Tire Co., Akron, O., makes an inner tube of the solid rubber, cushion type, which may be inserted in either quick detachable or clincher casings. Resiliency is obtained by radial grooves on each side of inner tube, or core. These grooves are staggered and are so designed, it is claimed, that they give ample displacement under pressure. No-Air cores are designed for both passenger and commercial cars.

Spark-Plug Switch—Fig. 7 illustrates a spark-plug cut-out switch made by the Cut-Out Switch Co., Broadway and One Hundred and Ninety-fifth street, New York City. This switch is connected between the spark-plug and high-tension wire. With a set of cut-out switches it is possible to locate a missing cylinder very easily and quickly by cutting out one spark-plug after another until the missing cylinder is located. The device is sold for 50 cents, delivered anywhere.

Auto Heel Rests—The popularity among motorists of various makeshift devices for supporting the heel when the accelerator pedal is being used, has led J. L. Lucas & Son, 3 Fox street, Bridgeport, Conn., to make a set of aluminum blocks of various sizes, especially for this purpose. These heel rests, Fig. 7, have a recess cut in their top surface into which the heel fits when using the accelerator.

Brass-Kote—The Northwestern Chemical Co., Marietta, O., makes an air-drying enamel that is intended especially for brass lamps, bumpers, rails, and other metal parts of the automobile. No filler or previous coat of any other substance is necessary before applying this enamel, which is put on with a brush and allowed to dry for 24 hours. It is claimed that the enamel will not crack with ordinary service. Three finishes are offered: gunmetal, hard rubber and glass black.

Pioneer Top Dressing—Another product of the Northwestern Chemical Co., Marietta, O., is a dressing for the automobile top. The maker says that this dressing gives the top surface a soft black finish and may be used with equal success on leather, canvas, Pantasote or mohair. Pioneer top dressing is claimed to produce an absolutely waterproof, elastic finish, one that will not crack no matter how often the top is folded or how hard the usage it receives.

Auto Primer—A simple primer, Fig. 8, is made by the Ideal Brass Works, Indianapolis, Ind. It consists of a gasoline reservoir located on the dash and a length of copper tubing running to the intake manifold. Before starting, the needle valve is opened slightly, allowing a little gasoline to flow into the intake manifold, thereby making starting easy. After the motor has started the needle valve should be closed. The primer may be had in nickel, brass or gun metal finish and comes complete with 26 inches of ⅛-inch copper tubing and the necessary connections. The height over all is 6 inches and the price is $2.50.

Dyer Welding Outfit—An oxygen-acetylene welding outfit, Fig. 8, is made by the Dyer Apparatus Co., 39 Piedmont street, Boston, Mass., which is suitable for welding, brazing, straightening and soldering and sells for $75. A burner for removing carbon from cylinders is furnished for an additional $10. This outfit is complete except for the oxygen and acetyelene tanks, which may be purchased from any company manufacturing them. The equipment, which comes in a mahogany cabinet, includes reducing valves and gauges for both oxygen and acetylene tanks, a blow torch with six tips, two 10-foot lengths of rubber tubing, with connections, cast iron and Tobin bronze fluxes, cast iron, aluminum and steel welding material, and a pair of goggles.

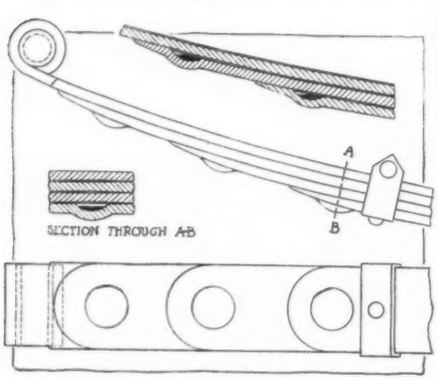


Fig. 6—Inter-leaf spring, showing bottom and side views, longitudinal section and cross-section through A-B. The cross-section illustrates the cup construction

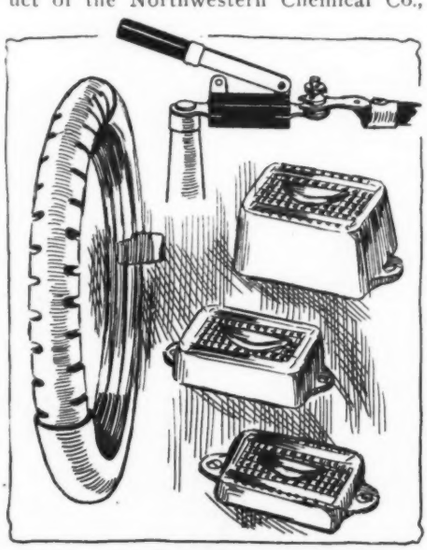


Fig. 7—Left, No-Air Core tire; shoe is cut away, showing construction of cushion tube. Right, top, spark plug cut-out switch. Right, bottom, auto heel rests

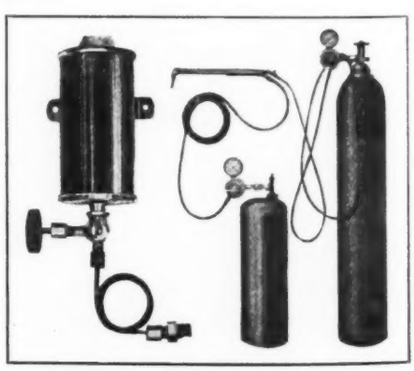


Fig. 8—Left, a gasoline primer, showing needle valve and pipe running to the manifold. Right, Dyer welding outfit, showing tanks, gauges, reducing valves and torch